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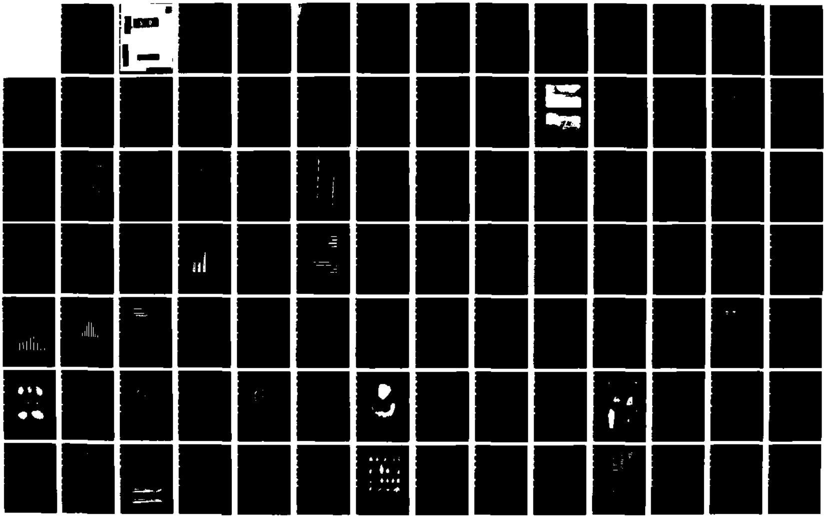

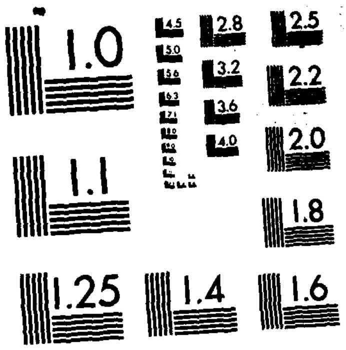

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Site 45-DO-285 is located at the north end of Buckley Bar, a landform in Rufus Woods Lake (Columbia River) at River Mile 587.5 near the Okanogan Highland-Columbia Plateau boundary. The site lies in an Upper Sonoran life zone. In 1979, the University of Washington excavated 137.2 m^3 of site volume under contract to the U.S. Army Corps of Engineers, Seattle District, as part of a mitigation program associated with adding 10 ft to the operating level behind Chief Joseph Dam. Systematic, aligned random sampling of 1 x 1 x 0.1-m collection units in 1 x 2 or 2 x 2-m cells disclosed four prehistoric components contained in point bar and later overbank deposits. The first two components are best characterized as Late Hudnut Phase. Projectile point styles and a single radiocarbon date indicate that these older components date between 3,000 and 2,000 years ago. The earliest cultural material is contained in point bar sands and gravels and overbank deposits; the later material in overbank deposits. Projectile point styles from the assemblages are similar to those of the Quilomene Bar Phase. The two more recent components are assigned to the Coyote Creek Phase. They contain projectile points similar to those found in the Cayuse Phase on the Middle Columbia and are dated by these styles and two radiocarbon dates to a period from 2000 B.P. to the protohistoric. This cultural material is also from overbank deposits, the most recent capped by aeolian and modern flood sediments. The zone assemblages show no change in technological or functional processes. There is, however, a change in raw material frequency with a high count of argillite in the earliest component. There are also indications of changes in use of food resources and in how intensely the site was used. The two earlier components show an emphasis on hunting large game including bison, elk, deer and mountain sheep. The later components have similar mammalian assemblages, but the final assemblage also contains Chinook salmon. Intensity of use was greatest in the earlier components, dropped sharply in the third, and rose again in the most recent. Debris concentrations are generally unstructured. There is little associated matrix modification to indicate stable living surfaces.

ARCHAEOLOGICAL INVESTIGATIONS AT SITE 45-DO-285, CHIEF JOSEPH DAM PROJECT, WASHINGTON

by

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With

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Final report submitted to the U.S. Army Corps of Engineers, Seattle District, in partial fulfillment of the conditions and specifications of Contract No. DACW67-78-C-0106.

The technical findings and conclusions in this report do not necessarily reflect the views or concurrence of the sponsoring agency.

Office of Public Archaeology
Institute for Environmental Studies
University of Washington

1984

ABSTRACT

Site 45-DO-285 is located at the north end of Buckley Bar, a landform in Rufus Woods Lake (Columbia River) at River Mile 587.5 near the Okanogan Highland-Columbia Plateau boundary. The site lies in an Upper Sonoran life zone. In 1979, the University of Washington excavated 137.2 m^3 of site volume under contract to the U.S. Army Corps of Engineers, Seattle District, as part of a mitigation program associated with adding 10 ft to the operating level behind Chief Joseph Dam. Systematic, aligned random sampling of 1 x 1 x 0.1-m collection units in 1 x 2 or 2 x 2-m cells disclosed four prehistoric components contained in point bar and later overbank deposits. The first two components are best characterized as Late Hudnut Phase. Projectile point styles and a single radiocarbon date indicate that these older components date between 3,000 and 2,000 years ago. The earliest cultural material is contained in point bar sands and gravels and overbank deposits; the later material in overbank deposits. Projectile point styles from the assemblages are similar to those of the Quilomene Bar Phase. The two more recent components are assigned to the Coyote Creek Phase. They contain projectile points similar to those found in the Cayuse Phase on the Middle Columbia and are dated by these styles and two radiocarbon dates to a period from 2000 B.P. to the protohistoric. This cultural material is also from overbank deposits, the most recent capped by aeolian and modern flood sediments. The zone assemblages show no change in technological or functional processes. There is, however, a change in raw material frequency with a high count of argillite in the earliest component. There are also indications of changes in use of food resources and in how intensely the site was used. The two earlier components show an emphasis on hunting large game including bison, elk, deer and mountain sheep. The later components have similar mammalian assemblages, but the final assemblage also contains Chinook salmon. Intensity of use was greatest in the earlier components, dropped sharply in the third, and rose again in the most recent. Debris concentrations are generally unstructured. There is little associated matrix modification to indicate stable living surfaces.

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Three Corps of Engineers staff members have made major contributions to the project. They are Dr. Steven F. Dice, Contracting Officer's Representative, and Corps archaeologists Lawr V. Salo and David A. Munsell. Both Mr. Munsell and Mr. Salo have worked to assure the success of the project from its initial organization through site selection, sampling, analysis, and report writing. Mr. Munsell provided guidance in the initial stages of the project and developed the strong ties with the Colville Confederated Tribes essential for the undertaking. Mr. Salo gave generously of his time to guide the project through data collection and analysis. In his review of each report, he exercises that rare skill, an ability to criticize constructively.

We have been fortunate in having the generous support and cooperation of the Colville Confederated Tribes throughout the entire length of project. The Tribes' Business Council and its History and Archaeology Office have been invaluable. We owe special thanks to Andy Joseph, former representative from the Nespelem District on the Business Council, and to Adeline Fredin, Tribal Historian and Director of the History and Archaeology Office. Mr. Joseph and the Business Council, and Mrs. Fredin, who acted as liaison between the Tribe and the project, did much to convince appropriate federal and state agencies of the necessity of the investigation. They helped secure land and services for the project's field facilities as well as helping establish a program which trained local people (including many tribal members) as field excavators and laboratory technicians. Beyond this, their hospitality has made our stay in the project area a most pleasant one. In return, conscious of how much gratitude we wish to convey in a few brief words, we extend our sincere thanks to all the members of the Colville Confederated Tribes who have supported our efforts, and to Mrs. Fredin and Mr. Joseph, in particular.

Site 45-DO-285 is located on land owned by Hydra, Inc. We also thank Hydra, Inc. and Mr. Harold Tesch, its manager, for granting us permission to excavate the site.

As authors of this report, we take responsibility for its contents. What we have written here is only the final stage of a collaborative process which is analogous to the integrated community of people whose physical traces we have studied. Some, by dint of hard labor and archaeological training, salvaged those traces from the earth; others processed and analyzed those traces; some manipulated the data and some wrote, edited and produced this report. Each is a member of the community essential to the life of the work we have done.

Jerry V. Jermann, Coprincipal Investigator during the field excavation and artifact analysis phase of the project, developed site excavation sampling designs that were used to select data from each site. The designs provided a uniform context for studying prehistoric subsistence-settlement patterns in the project area. Jerry Lyons directed site excavations at 45-DO-285.

S. Neal Crozier did the initial data summary for the stratigraphic analysis; he also performed the chemical and mechanical sort analyses. Sarah K. Campbell compiled the data for analytic zone definitions. The laboratory staff under the direction of Karen Whittlesey did the technological and functional artifact analysis. Janice Jaehnig did keypunching and John Chapman and Duncan Mitchell manipulated the computerized data.

The writing of the report itself is a cooperative effort. Christian J. Miss wrote Chapters 1, 3 and 5. As senior author, she also coordinated and integrated the contributions of the other authors. Sarah K. Campbell wrote Chapter 2; Stephanie Livingston analyzed the faunal assemblage and wrote Chapter 4.

Helen Mundy Hudson edited the text; Dawn Brislawn typed it and coordinated production. Fred Clark and James Bennett prepared working copy of many of the figures; Melodie Tune and Bob Radek drafted the final versions and Larry Bullis potographed the artifacts.

PREFACE

The Chief Joseph Dam Cultural Resources Project (CJDCRP) has been sponsored by the Seattle District, U.S. Army Corps of Engineers (the Corps) in order to salvage and preserve the cultural resources imperiled by a 10 foot pool raise resulting from modifications to Chief Joseph Dam.

From Fall 1977 to Summer 1978, under contract to the Corps, the University of Washington, Office of Public Archaeology (OPA) undertook detailed reconnaissance and testing along the banks of Rufus Woods Lake in the Chief Joseph Dam project area (Contract No. DACW67-77-C-0099). The project area extends from Chief Joseph Dam at Columbia River Mile (RM) 545 upstream to RM 590, about seven miles below Grand Coulee Dam, and includes 2,015 hectares (4,979 acres) of land within the guide-taking lines for the expected pool raise. Twenty-nine cultural resource sites were identified during reconnaissance, bringing the total number of recorded prehistoric sites in the area to 279. Test excavations at 79 of these provided information about prehistoric cultural variability in this region upon which to base further resource management recommendations (Jermann et al. 1978; Leeds et al. 1981).

Only a short time was available for testing and mitigation before the planned pool raise. Therefore, in mid-December 1977, the Corps asked OPA to review the 27 sites tested to date and identify those worthy of immediate investigation. A priority list of six sites was compiled. The Corps, in consultation with the Washington State Historic Preservation Officer and the Advisory Council on Historic Preservation, established an Interim Memorandum of Agreement under which full-scale excavations at those six sites could proceed. In August 1978, data recovery (Contract No. DACW67-78-C-0106) began at five of the six sites.

Concurrently, data from the 1977 and 1978 testing, as well as those from previous testing efforts (Osborne et al. 1952; Lyman 1976), were synthesized into a management plan recommending ways to minimize loss of significant resources. This document calls for excavations at 34 prehistoric habitation sites, including the six already selected (Jermann et al. 1978). The final Memorandum of Agreement includes 20 of these. Data recovery began in May 1979 and continued until late August 1980.

Full-scale excavation could be undertaken at only a limited number of sites. The testing program data allowed identification of sites in good condition that were directly threatened with inundation or severe erosion by the projected pool raise. To aid in selecting a representative sample of prehistoric habitation sites for excavation, site "components" defined during testing were characterized according to (1) probable age, (2) probable type of occupation, (3) general site topography, and (4) geographic location along the

river (Jermann et al. 1978:Table 18). Sites were selected to attain as wide a diversity as possible while keeping the total number of sites as low as possible.

The Project's investigations are documented in four report series. Reports describing archaeological reconnaissance and testing include (1) a management plan for cultural resources in the project area (Jermann et al. 1978), (2) a report of testing at 79 prehistoric habitation sites (Leeds et al. 1981), and (3) an inventory of data derived from testing. Series I of the mitigation reports includes (1) the project's research design (Campbell 1984d) and (2) a preliminary report (Jaehnig 1983b). Series II consists of 14 descriptive reports on prehistoric habitation sites excavated as part of the project (Campbell 1984b; Jaehnig 1983a, 1984a,b; Lohse 1984a-f; Miss 1984a-d), reports on prehistoric nonhabitation sites (Campbell 1984a) and burial relocation projects (Campbell 1984c), and a report on the survey and excavation of historic sites (Thomas et al. 1984). A summary of results is presented in Jaehnig and Campbell (1984).

This report is one of the Series II mitigation reports. Mitigation reports document the assumptions and contingencies under which data were collected, describe data collection and analysis, and organize and summarize data in a form useful to the widest possible archaeological audience.

1. INTRODUCTION

Site 45-DO-285 is on the north end of Buckley Bar at River Mile 587.5 in the NE1/4 SW1/4 NW1/4 Section 35, T.30N, R.30E (U.T.M. Zone 11, N.5,324,657, E.349,921). The site is approximately 291 m (954.5 ft) above m.s.l. and about 3 m above the 1978 operating pool level of Rufus Woods Lake (Figure 1-1).

Although traditionally called a "bar", Buckley Bar was an island even before Chief Joseph Dam was built (Figure 1-2 and Chapter 2). The site is on a low terrace at the island's downstream end. The western portion of the area has been eroded onto a floodplain, forming a site boundary. The site is bounded on the north by the Columbia River. Site boundaries to the east and south were determined in 1977 during testing with a series of .5 x .5 m units. The Bar continues beyond the site as an island of low relief created by fluvial processes (Plate 1-1 and 1-2).

The topography surrounding the site offers access to a variety of land forms and resources. Moses and Sanderson Creeks, both perennial streams are located within 5 km upstream of the site. Before Rufus Woods Lake covered them, Monaghan Rapids were just downstream from Buckley Bar and Equilibrium Rapids and Nespelem Rapids were within 10 km.

On the west side of the river, about 2.5 km from the site, the land rises to an escarpment (ca. 790 m m.s.l.) of the Columbia Plateau. On the Plateau, within 10 km of the site, are a number of small pothole lakes, the la est of which are Smith, Rock, and Black Lakes. Across the Columbia River east of the site, the land rises more gently to a similar height, and then steeply to the ridges and peaks of the Okanogan Highlands. Rebecca Lake, Buffalo Lake, McGinnis Lake, and several smaller lakes, all fed by the Buffalo Lake aquifer, lie within 10 km. The nearest edges of the Highland coniferous forest border the eastern ends of Buffalo and McGinnis Lakes.

The Project area has a semiarid climate characterized by hot summers and moderate winters (Daubenmire 1970:6). In summer, clear skies prevail; temperatures are warm during the day and cool at night. In winter and early spring, storm fronts from the north Pacific bring overcast skies. The marine air masses, however, lose most of their moisture crossing the coastal mountain ranges so overall precipitation is slight. Winter temperatures are mild, moderated by marine air flows.

The site lies within the _Artemesia tridentata-Agropyron_ vegetation association of the river's course (Daubenmire 1970). This vegetation zone is characterized by sagebrush and bunch grass communities with brushy thickets along stream courses. Vegetation on the site is relatively sparse consisting of scattered bitterbrush (_Purshia tridentata_), sagebrush (_Artemesia_ sp.) and

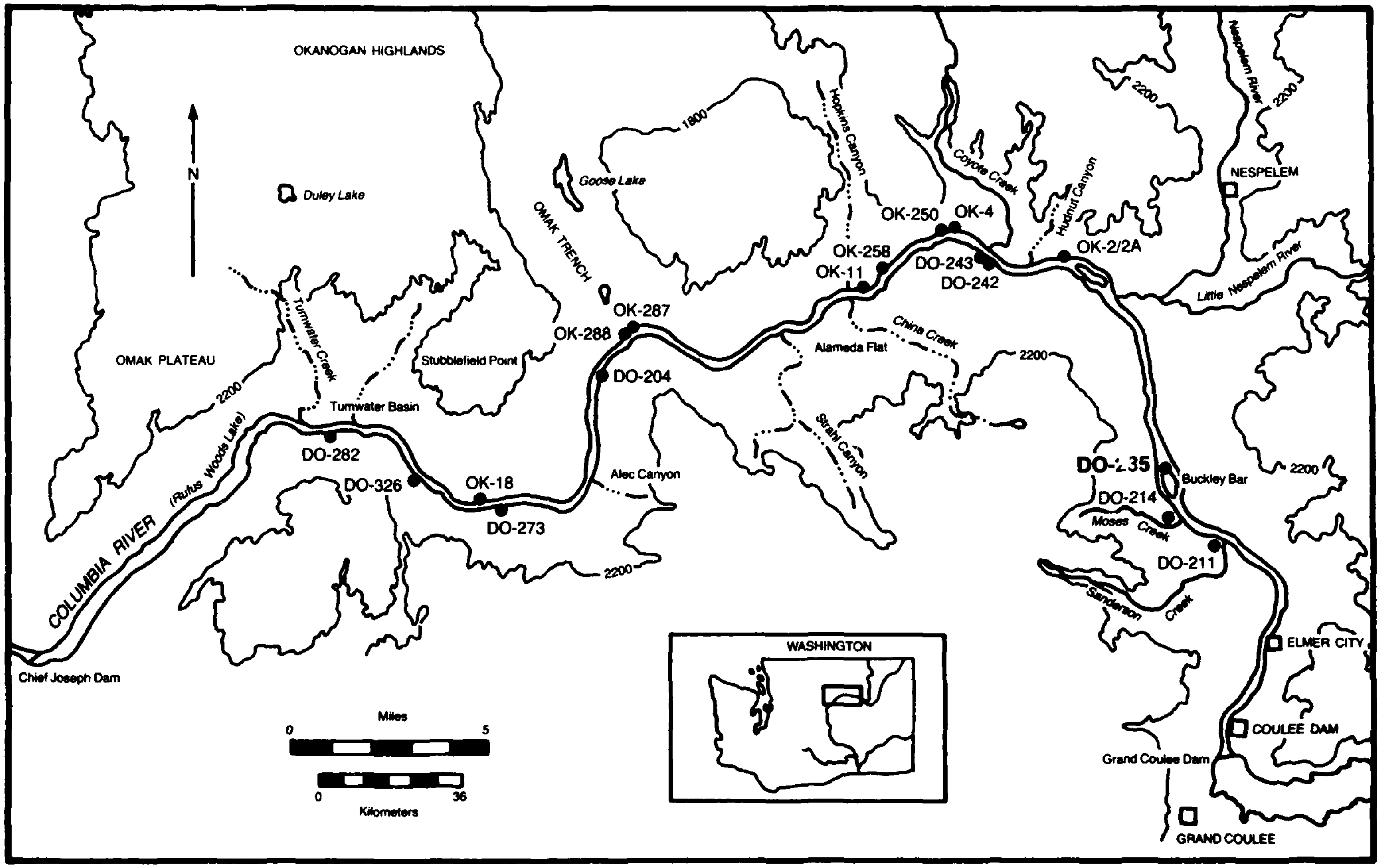


Figure 1-1. The Chief Joseph Dam Cultural Resources Project area.

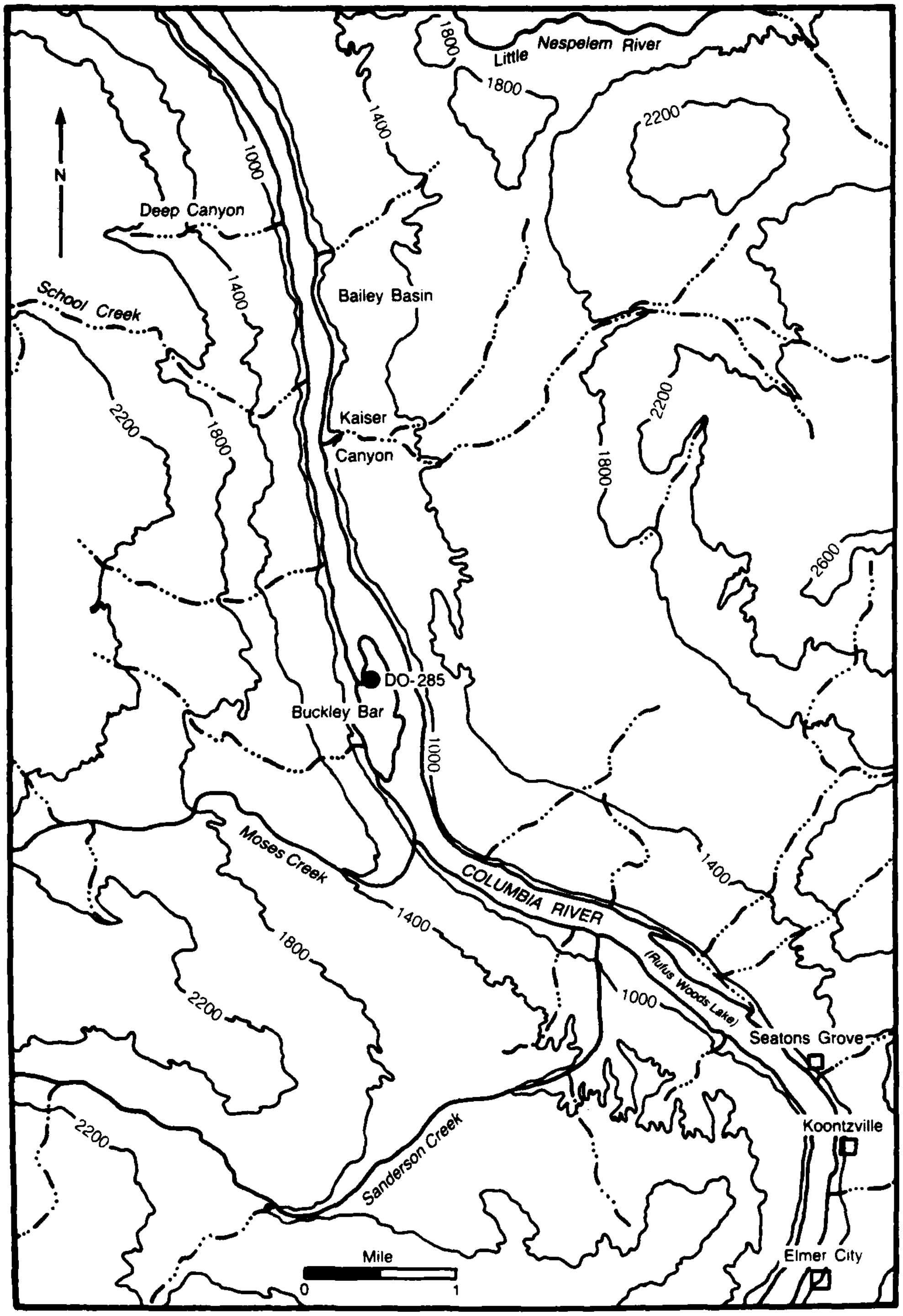


Figure 1-2. Vicinity map, 45-DO-285 (adapted from U.S.G.S. map, Alameda Flat, 15' Series, 1950).

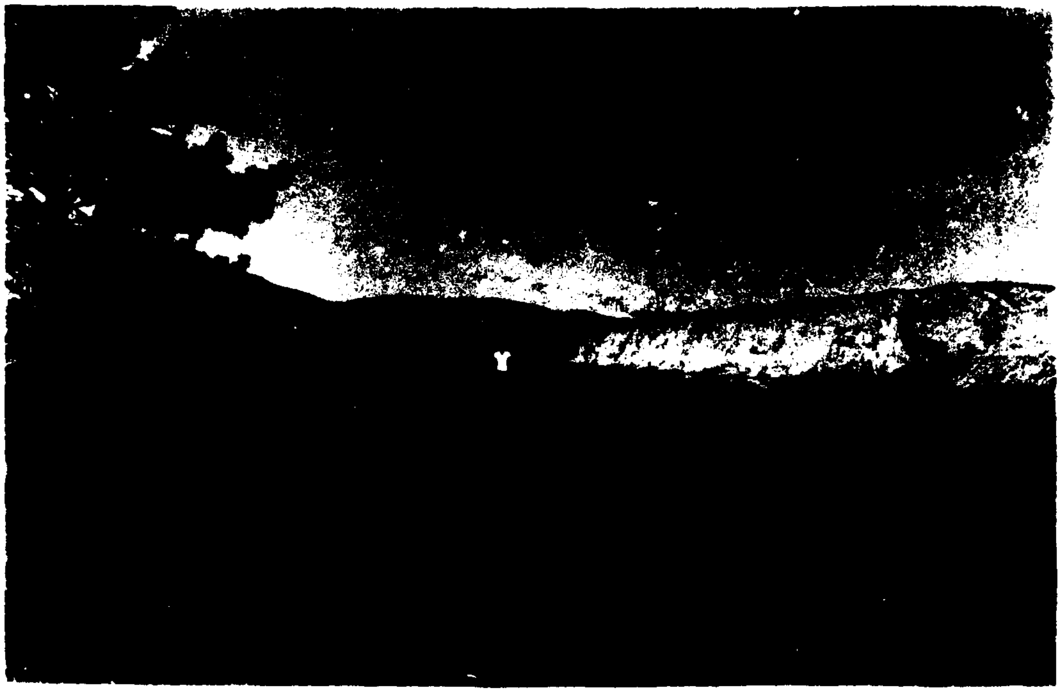


Plate 1-1. Site overview, facing north, 45-DO-285.

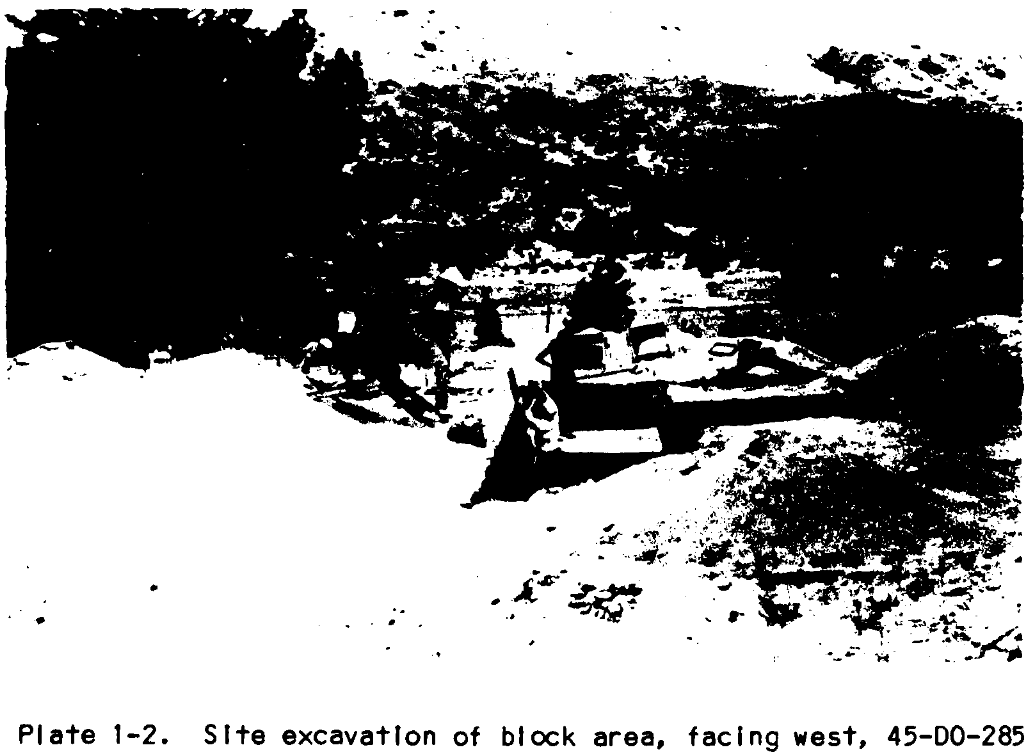


Plate 1-2. Site excavation of block area, facing west, 45-DO-285.

grasses. A single ponderosa pine is on the site and small stands of ponderosa are along nearby reservoir banks.

INVESTIGATIONS AT 45-DO-285

Site 45-DO-285 was first recorded in 2976 (Munsell and Salo 1977) and was one of 79 sites tested under the original 1977-78 contract with the Army Corps of Engineers. Testing indicated at least two cultural components in a stratified context. No material that could be radiocarbon dated was associated with the upper occupation; the lower component yielded a radiocarbon date of 1680±950 B.P. (TX-3051). The site thus had the potential to yield artifact assemblages from the last 3,000 years. There were no housepit depressions but the relatively dense cultural material suggested the site contained information about non-village activities. Its location at the downriver end of Buckley Bar near Monaghan Rapids, a prime fishing area, and its proximity to two other sites (45-DO-211 and 45-DO-214) encouraged excavation. These three sites are clustered at the eastern edge of the project area some distance upriver from other project area sites, offering the possibility of comparison with downriver sites. The final reason for excavation was the imminent destruction of the site by the pool raise.

For the 1979 excavations, a two-stage sampling design was developed. During the first stage, a probabilistic sample of units was selected for excavation. This portion of the sample design provides unbiased data for characterizing site content. During the second stage, a purposive sample was selected to provide information about site structure in specific areas.

Probabilistic sampling at 45-DO-285 was conducted within a stratified unaligned systematic design. Sampling strata were created by dividing the site into seven sets of grid units, each composed of 25 2 x 2-m units arranged in squares. Each 2 x 2-m unit within a stratum was designated by a Cartesian coordinate with a value of 1 to 5 assigned to points on the x and y axes. Beginning with the first stratum, two coordinates for the first unit were selected randomly. In the horizontal tier, the other three first order sample units were found by holding the original x coordinate constant and randomly choosing new y coordinates for the other strata. An identical procedure was used to determine the vertical tier units except the y coordinate was held constant and the x randomly varied. Following the selection of first order units, the same procedure was used to develop the second and third order units. The sampling strata and selected random units are shown in Figure 1-3.

These random or probabilistic units were excavated primarily as 1 x 2-m units although two 2 x 2-m units were dug in the vicinity of the 1977 test units. Both first and second order units were excavated in all strata except for the most northern. In this stratum, only the first order unit was available for excavation. Excavation of 13 probabilistic units covered a total area of 30 m^2, approximately 4.3% of the total site area.

Excavation of the 1977 test unit and nearby probabilistic units yielded large amounts of cultural material. To explore the area more extensively, 11 non-random or purposive units totalling 38 m^2 were excavated (Figure 1-4). A single purposive 2 x 2-m unit, 20S22W, was excavated south of the site

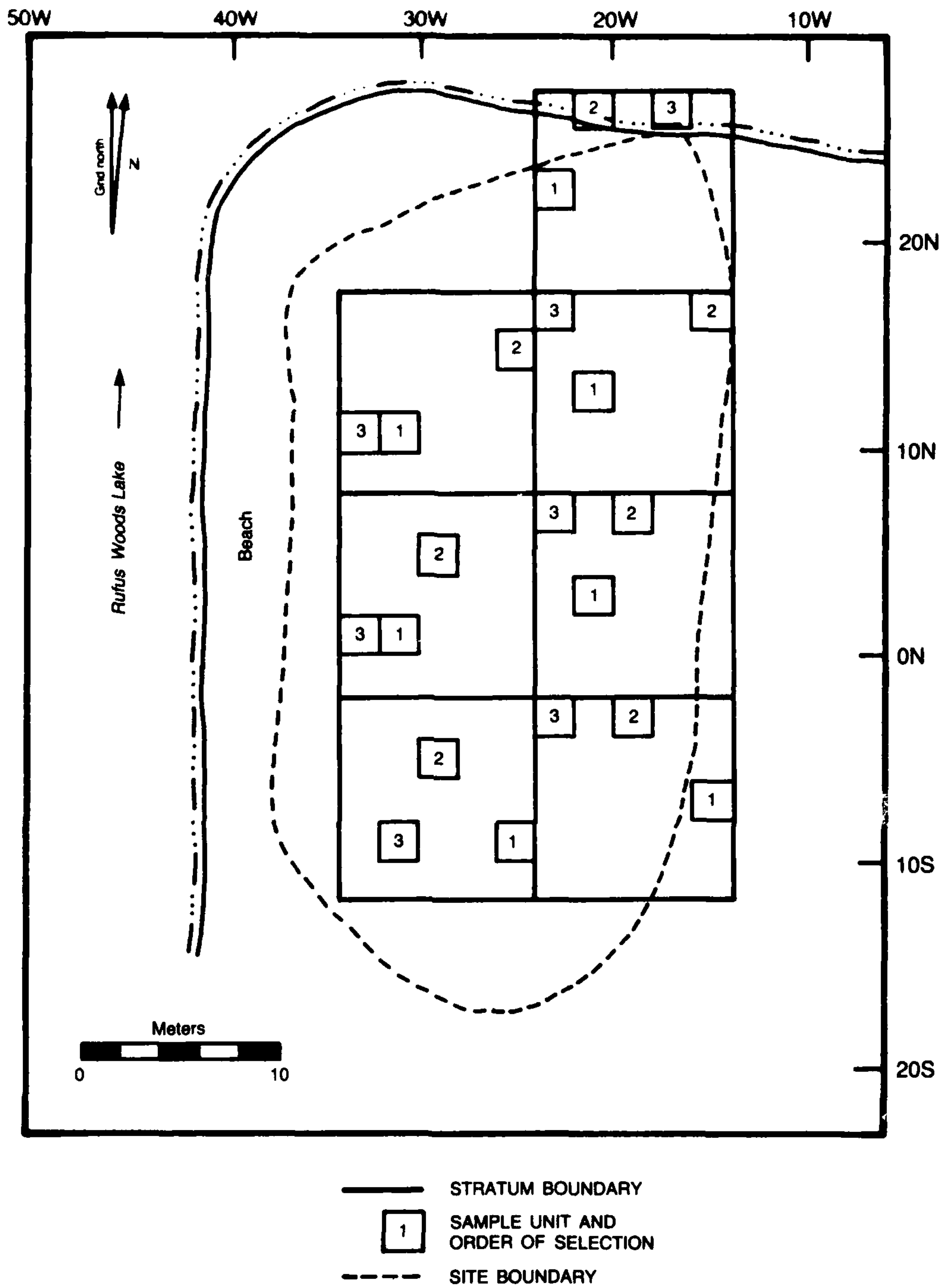


Figure 1-3. Sampling design, 45-DO-285.

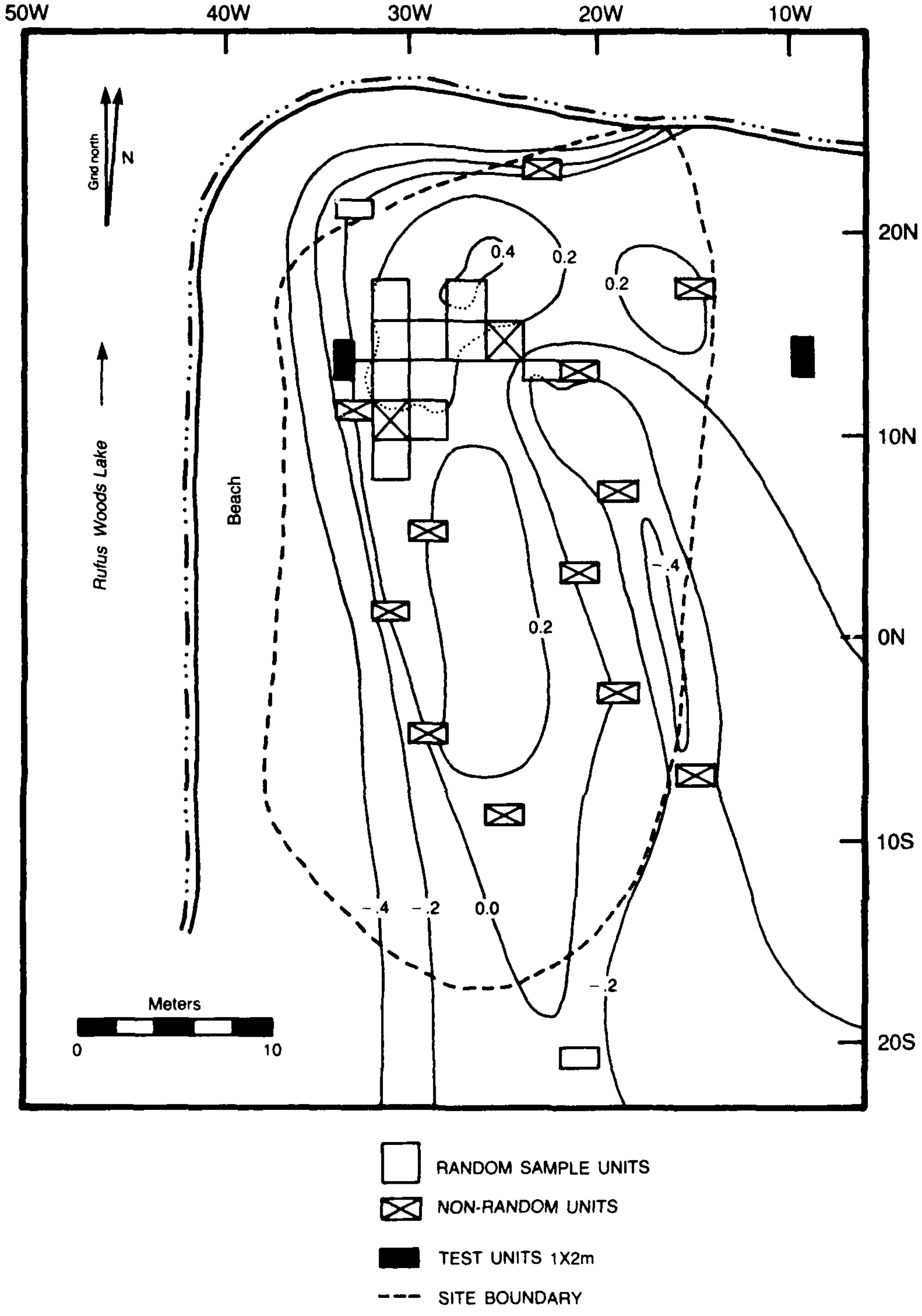


Figure 1-4. Excavated units, 45-DO-285.

boundary to clarify depositional and cultural associations. Approximately 9.7% of the total site area of 700 m^2 was covered by the excavation of 68 m^2 of both random and nonrandom units.

Full scale excavations at 45-DO-285 lasted from May 16 to July 17, 1979. The field crew, consisting of a field supervisor and 13 excavators, screened 142.5 m^3 of matrix from 72 1 x 1-m units. Field excavation methods used at the site are described in the project's plan of action (Jermann and Whittlesey 1978) and research design (Campbell 1984).

REPORT ORGANIZATION

An assemblage of 2,183 fire modified rocks, 38,564 lithic artifacts, 24,293 bones and bone fragments, and 211 non-lithic artifacts was recovered. The subsequent chapters present the results of the analysis of this material. Chapter 2 discusses the site's natural and cultural stratigraphy. Chapters 3 and 4 summarize the results of the artifact and faunal analyses. The final chapter synthesizes the data, discussing site chronology and function.

2. STRATIGRAPHY AND CHRONOLOGY

Interpretation of the prehistoric record of the project area requires that one understand the depositional history of each site in the context of the depositional history of the entire area. To do this, each site must be divided into units which can be compared to those at other project sites and be used to delimit episodes of cultural deposition. Stratigraphy provides temporal control within each site as well as a means of correlating cultural deposits with regional geomorphology.

This chapter discusses the geologic setting of site 45-DO-285 with reference to local geologic history and describes the sedimentary history of the site itself. Strata mapped during excavation are grouped into site-wide depositional units which provide the basis for determining how deposition occurred and for correlating cultural materials among units.

GEOLOGIC SETTING

The entire project area lies within the Columbia River canyon which is cut into Miocene and Cretaceous bedrock formations, and filled with a variety of unconsolidated sediments of Pleistocene and Holocene age. The bulk of the deposits are Pleistocene in age, laid down by glacial-related events such as ice movement, lake formation, and canyon downcutting, all of which affected vast areas. The less extensive Holocene deposits resulted from depositional agents with more localized effects: tributary streams, wind, downslope movement, and the Columbia River. Throughout the Pleistocene and Holocene, the movements of water and ice have been constrained by older bedrock deposits. The detailed discussion of the immediate site vicinity emphasizes Holocene events pertinent to interpreting deposition at 45-DO-285. A complex history of landforms is apparent in the vicinity of the site (Figure 2-1). The prominent terrace system resulting from the Columbia's rapid post-Pleistocene downcutting of glaciolacustrine sediments is visible in the Nespelem silt formation on the eastern bank of the river. Although the terraces were cut before the Buckley Bar point bar sediments were deposited, undercutting and sliding of these steep banks may have affected the position of the river channel during the period of the bar formation. Buckley Bar itself is a former channel margin point bar which was cut off from the mainland sometime prior to the construction of Chief Joseph Dam. The stratigraphic profiles at 45-DO-285 contain evidence of the point bar stage, as well as subsequent alluvial and aeolian deposition. We found evidence of at least two site-wide bank overflows including the well documented flood of 1948.

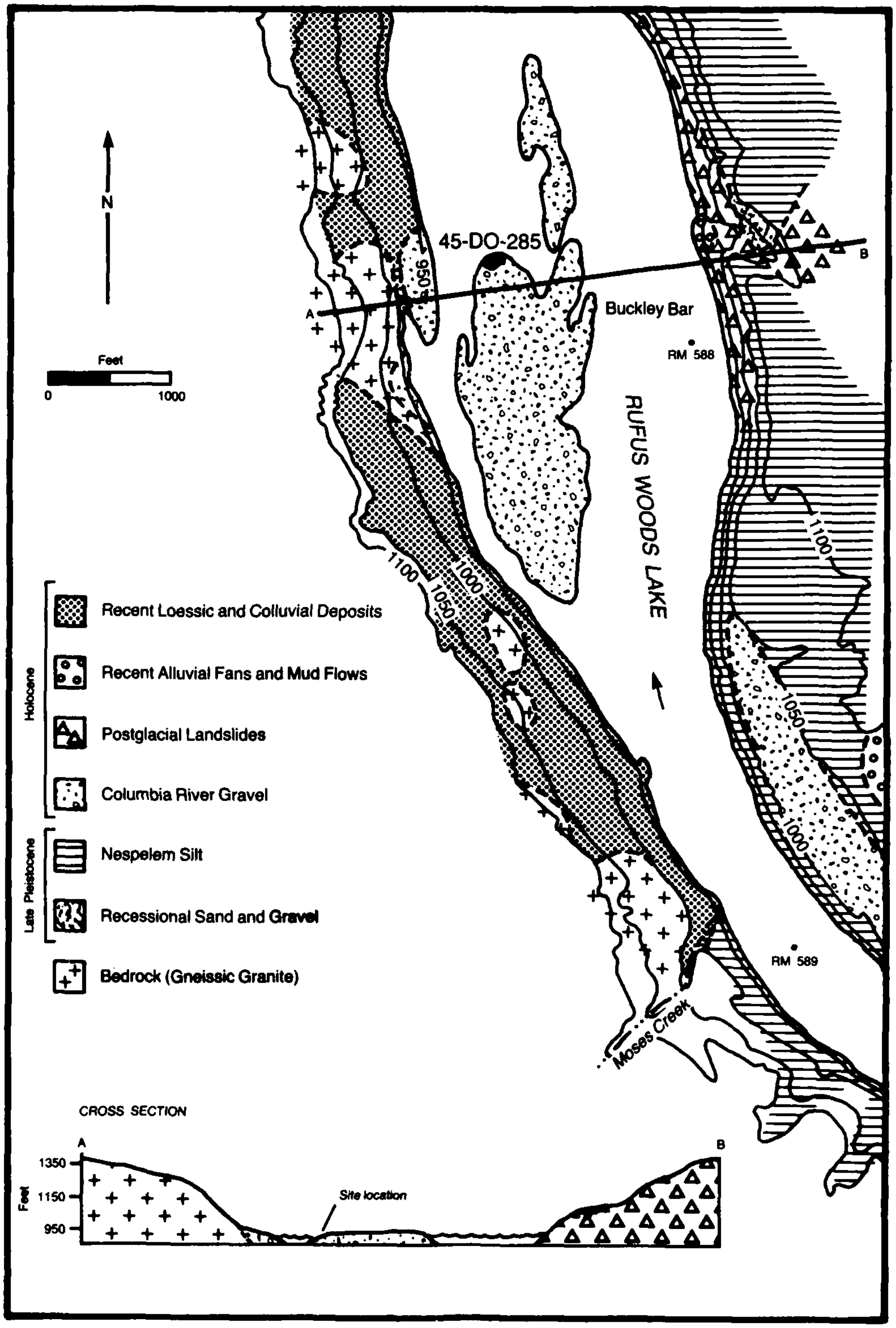


Figure 2-1. Geologic map, 45-DO-285.

PROCEDURES

The stratigraphic crew profiled 105 linear meters of wall in 23 excavation units. Figure 2-2 shows the location of the excavated units, profiled walls, and three column samples. The 48 individual samples from the columns, and ten additional excavator-collected level samples were subjected to chemical and physical analyses and the results used to help establish a natural depositional sequence (Appendix A). Natural depositional units based on physical description, sediment source, transport mechanism, environment of deposition, and post depositional alteration are then used to define cultural depositional episodes (called cultural analytic zones) in the final section of the chapter.

DEPOSITIONAL UNITS

The sediment profile at 45-DO-285 is not complex, owing its origin solely to fluvial and wind deposited materials. The 11 field strata (Table 2-1) have been grouped into the five temporally distinct depositional units described below. East-west and north-south transect profiles show the depositional units and strata in the block excavation area (Figure 2-3). A more detailed profile (Figure 2-4) illustrates the major stratigrapic markers and the occurrence of cultural materials.

The oldest depositional unit (DU I) is the remains of the point bar deposition which initially formed Buckley Bar. It consists of a site-wide basal gravel bed (Stratum 600) and associated graded sands (Stratum 500). These gravels, pebbles and sands are water-rounded and contain a mixture of granitics and basalt which are oriented downstream. Beds of similar materials are found in the same stratigraphic position on the adjacent mainland shore. All were deposited before Buckley Bar became an island.

DU II is a series of interbedded sands and silts, distinctive because of their wide variation in texture and strong bedding. It includes Strata 500, 450, 400, and 300. Stratum 500, a thin band of slackwater silt deposits has a nearly site-wide distribution, disappearing only in the eastern (highest) area of the site. In some areas, a second and higher silt band (Stratum 400) also occurs, separated from the lower by intervening medium to coarse sands. These interbedded sediments are point bar deposits.

The third depositional unit (DU III) is a series of overbank deposits. It includes several individual strata, 250, 200 and 150. Although each stratum tends to be uniform and massive, it was possible to trace internal stratigraphic boundaries marked by subtle color and texture changes, and by relatively clear boundaries. The sediments are coarsest nearest the shoreline and become finer to the east, a pattern of texture gradation typical of overbank deposits. The concentration of wind-modified or deposited sediments increases toward the surface. Both vertical and lateral alluvial sediment accretion are evident; we postulate that sometime during this accumulation, the point bar was separated from the mainland. Although sediments of DU II and DU III somewhat resemble each other, they differ enough to suggest that

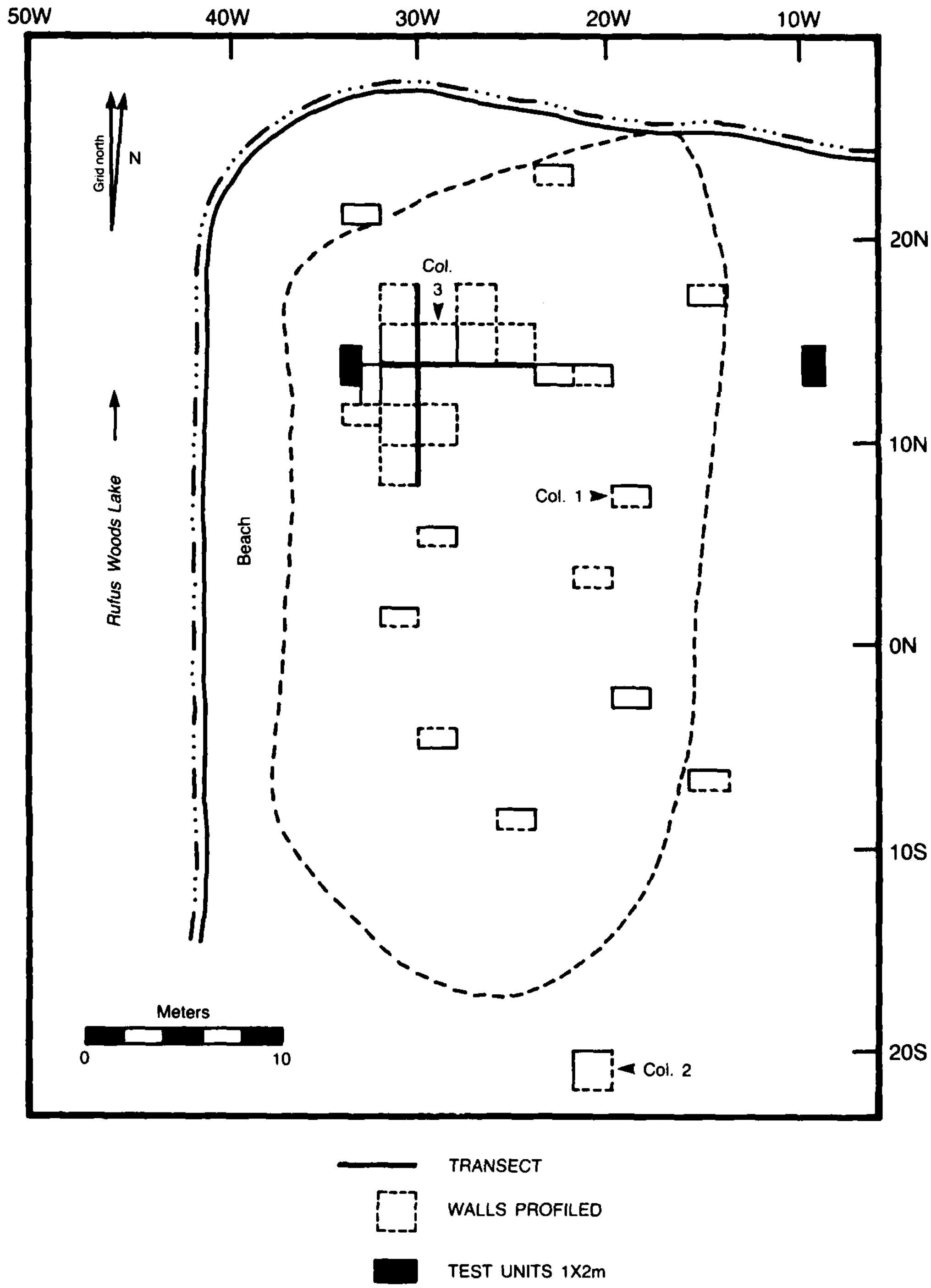


Figure 2-2. Locations of profiled walls, column samples and stratigraphic transects, 45-DO-285.

Table 2-1. Stratigraphic descriptions, 45-DO-285.

Depositional Unit	Type of Deposit	Strata	Physical Description
V	Post-1948 aeolian deposit	50	Sand to loamy sand, angular to subangular grains, loose, grayish brown (10YR5/2), pH 7.1-7.8. Also includes surface litter mat. Boundary abrupt to clear, smooth.
IV	1948 flood deposit	100	Loam to loamy sand, subangular to rounded grains, firm to slightly hard, pale brown (10YR6/3), pH 8.3-8.5. Boundary abrupt to clear, smooth. Slackwater deposit site-wide.
III	Mixed overbank and aeolian deposits	150	Sand to sandy loam, subangular and subrounded grains, loose to soft, grayish brown (10YR5/2), pH 8.5-8.7. Boundary gradual, smooth. Site-wide deposit of mixed aeolian and alluvial material.
		200	Loamy sand to sandy loam, subangular to rounded grains, slightly firm to soft, fine, blocky structure, light brownish gray (10YR6/2), pH 8.7-9.0. Boundary gradual, smooth. Site-wide alluvial deposit, less aeolian material than Stratum 150.
		250	Loam sand to sandy loam, slightly firm to soft, light brownish gray (10YR6/2), pH 8.7-9.1. Boundary gradual, smooth to wavy. Site-wide alluvial deposit, less aeolian material than Stratum 200.
II	Interbedded sands and silts	300	Loamy sand to sandy loam, moderately well sorted, grains subrounded, firm to soft, light brownish gray (10YR6/2), pH 8.5-9.0. Boundary clear to abrupt, smooth. Not site-wide.
		400	Sandy loam to loam, firm to slightly hard, light brownish gray (10YR6/2), pH 8.5-8.8. Boundary clear, smooth. Slackwater deposit, not site-wide.
		450	Loamy sand, loose, light brownish gray (10YR6/2). Boundary clear, smooth. Alluvial deposit, not site-wide.
		500	Sandy loam to loam, firm to slightly hard, light brownish gray (10YR6/2), pH 8.5-8.8. Boundary abrupt to clear, smooth to broken. Slackwater deposit, nearly site-wide.
I	Gravel bar and associated sand	550	Medium to coarse sand to loamy sand, grains water rounded, loose, unconsolidated, light brownish gray (10YR6/2), pH 8.[illegible]-8.9. Boundary abrupt, wavy. Not site-wide, eroded in some units.
		600	Rounded granite and basalt pebbles with sand matrix. Sand matrix slightly coarser than Stratum 500, loose, unconsolidated, light brownish gray (10YR6/2), pH 8.0-8.4.

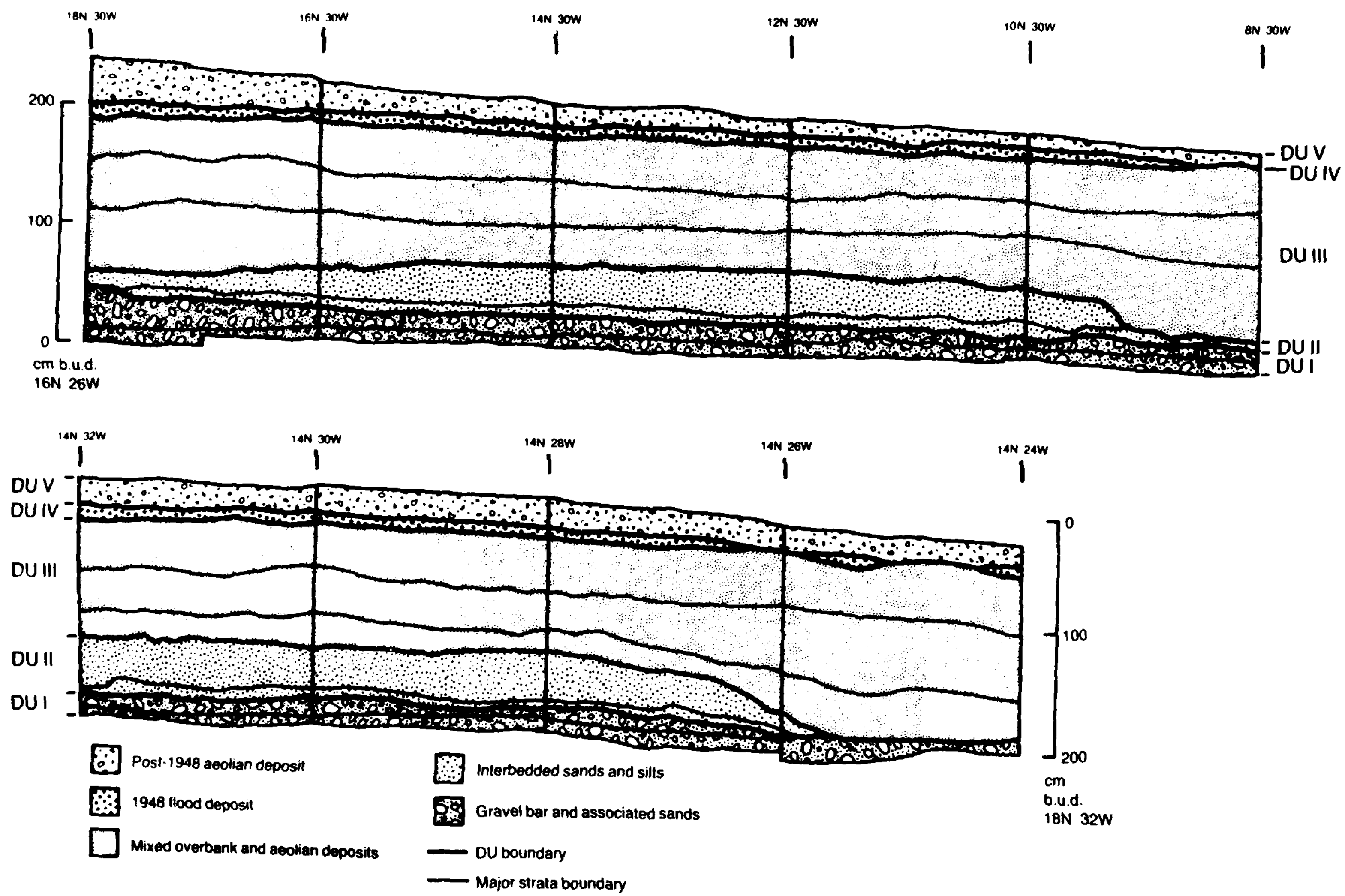


Figure 2-3. Stratigraphic profiles, 45-DO-285: top - 8N to 16N/30W; bottom - 14N/24N to 32W.

Buckley Bar may have separated from the mainland before the accumulation of DU III.

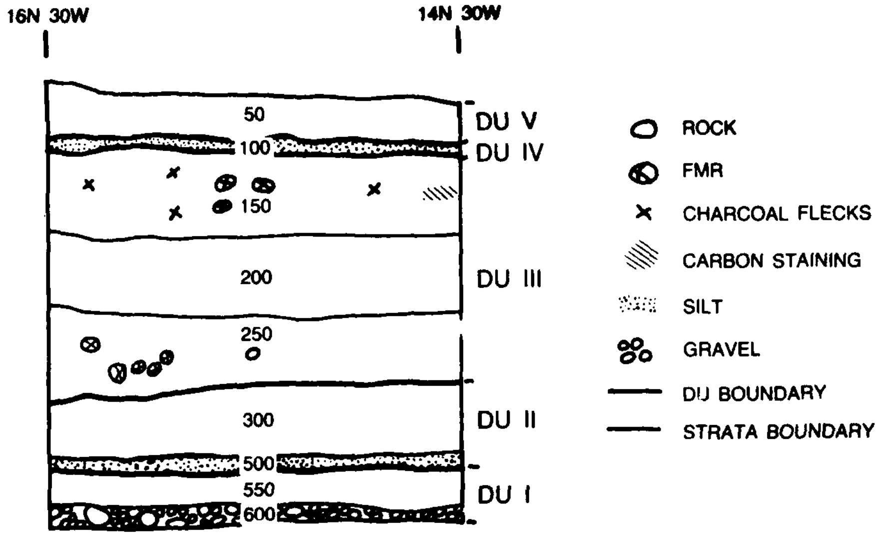


Figure 2-4. Stratigraphic profile of 16N30W, 45-DO-285.

DU IV is equivalent to Stratum 100, a thin compact layer of silt-sized particles. The fine size of the particles suggests that it is a slackwater deposit laid down in the quiet backwaters of a large flood. Vertical sediment accretion, or overbank deposits, are typically the finest-grained material in a flood plain. That the deposit is thin is not inconsistent with the flood's size. High flows do not necessarily mean high concentrations of material; the opposite has often been observed. Even record floods may deposit as little as 1/8 in of material spread uniformly over the flooded area (Wolman and Leopold 1957:71).

The late stratigraphic position of the flood deposit suggests that it may be related to one of the major historic floods recorded on the Columbia River. Its similarity to deposits at other sites associated with datable artifacts suggests that it was laid down by the 1948 flood which produced peak discharges five times greater than the normal rate.

The youngest deposits at 45-DO-285, DU V, consist of aeolian material (Stratum 50), deposited since the 1948 flood and covered by a thin organic litter mat at its upper surface.

CULTURAL ANALYTIC ZONES

Cultural materials are associated with both the point bar and overbank deposits at 45-DO-285. Four separate cultural episodes corresponding to natural stratigraphic divisions were defined as cultural analytic zones. Table 2-2 summarizes the relationship of the zones to the stratigraphic deposits and lists their contents and associated radiocarbon dates.

Table 2-2. The analytic zones of 45-DO-285: their stratigraphic definition, radiocarbon dates, and contents.

Zone	DU	Stratum	Major Description	Radiocarbon[1] Dates (Years B.P.)	Lithic N Row %	Nonlithic N Row %	Bone N Row % grams	Shell N Row % grams	FMR N Row % grams	Total[2]	# Features	Volume (m^3)	Density Objects/(m^3)
1	V IV III	50 100 150	Aeolian, 1948 flood, Overbank	299±90 350±80	11,347 59.8	112 0.6	6,634 35.0 1,507	2 <0.1 29	872 4.6 160,540	18,967	13	52.9	358.5
2	III	200	Overbank		4,322 66.2	23 0.4	2,139 32.8 536	- - -	42 0.6 134.6	6,526	-	26.3	248.1
3	III	250	Overbank	1680±950	13,189 58.9	40 0.2	8,465 37.8 3,616	- - -	686 3.1 141,721	22,380	13	29.0	771.7
4	II I	300 400,500 550 600	Overbank Silt lenses		9,706 55.9	33 0.2	7,050 40.6 3,494	1 <0.1 1	570 3.3 161,364	17,360	6	28.9	600.7
Subtotal (count)					38,564	208	24,288	3	2,170	65,233	32	137.1	475.8
Unassigned Material, N=					-	-	5	-	13	18			
TOTAL					38,564	208	24,293	3	2,183	65,251	32		

1 See Appendix A
2 Does not include historic material or miscellaneous.

ZONE 4

The deepest culture-bearing deposits at the site (Strata 300-550) are the interbedded silts and medium sands which overlie the basal cobbles (Stratum 600) in the western area of the site. These deposits thin to the east, changing from two silt deposits and two sand deposits to a single silt deposit overlying the cobbles. Cultural materials occur in association with the silt bands as well as with the intervening sand. Two distinct peaks occur where there are two silt bands, but as these cannot be separated to the east, they are treated as a single zone. Even in the eastern area, a distinct peak of cultural materials is associated with the silt layer above the cobbles; associated projectile points confirm that these belong to the Zone 4 occupation rather than the later Zone 3 occupation. The few features recorded consist entirely of concentrations of artifacts without spatial patterning.

ZONE 3

The cultural materials from the oldest overbank deposits at the site, Stratum 250, comprise Zone 3, which is consistently associated with a peak of cultural materials and relatively frequent features. The features are all unstructured artifact concentrations, possibly indicating deflation. Charcoal from this zone was radiocarbon dated to 1680±950.

ZONE 2

Cultural materials from Stratum 200 are assigned to Zone 2. Although the zone's excavated volume is only slightly less than that of Zone 3, its cultural assemblage is much smaller than that of either Zone 1 or Zone 3. No features were found. The sparse cultural deposition indicates that either natural deposition was more rapid or cultural use less intense than in the bracketing zones. Stratum 200 thins toward the east and could not be defined in two of the excavation units, 8N20W and 6S16W. Since only the top 30 cm was excavated in 14N24W, Zones 2, 3 and 4 do not appear in it.

ZONE 1

Stratum 150, the most recent overbank deposit, is associated consistently with a peak of cultural materials. Occasional features were recorded, although all but one circular cluster of FMR are unstructured concentrations. Two radiocarbon samples associated with these materials date them to approximately 300 B.P. The two overlying deposits, the 1948 flood deposit (Stratum 100), and the post-1948 aeolian deposit (Stratum 50), are thin and nearly sterile. The occasional prehistoric cultural artifacts found in them probably originated from the occupation in Stratum 150. Zones 1, 2 and 3 do not appear in the southern quads of 20S22W from which the upper 250 cm were removed without screening.

SUMMARY

Buckley Bar is a channel margin point bar which has been cut off from the mainland by the formation of a new channel. Since it became an island, most of its sediments owe their presence to overbank deposition; aeolian deposition has increased in importance through time. Cultural materials are found in association with the point bar deposits, laid down when the bar was still part of the mainland. Prehistoric people used the site when it was a bar and continued to use it after it became an island; numerous cultural remains are found in the overbank deposits. A cultural explanation may be found for the predominance of unstructured features, but the low elevation and mid-channel position of the island and its susceptibility to flooding and flood erosion is more likely responsible.

3. ARTIFACT ANALYSES

This chapter presents analyses of lithic and nonlithic items modified by use and/or manufacture recovered at 45-DO-285. The remainder of the assemblage is distributed among the categories of bone, shell and fire-modified rock (FMR). An analysis of identifiable bone is presented in Chapter 4. The weights and numbers of unidentified bone, shell, and FMR have been recorded by collection unit. Their distribution and significance are discussed in Chapter 5.

Of the 65,251 objects from 45-DO-285, 38,772 are worn, modified, or the by-products of manufacture. The numbers of objects found in each zone along with excavation totals are recorded in Table 2-2.

This material has been categorized on the basis of morphological, technological and functional attributes. For ease in comparing categories of artifacts among the site zones, in the project area, and in the region, traditionally used descriptors, such as drill, graver and burin, are used to name the objects. The distribution of these categories by zone is shown in Table 3-1. Since these names imply uses which may or may not be accurately attributed, their definitions will be evaluated in the functional analysis section of this chapter.

The lithic objects described below have been analyzed technologically and functionally. Technological analysis focuses on the use of lithic resources describing the raw materials and the by-products of manufacture. Functional analysis examines how lithic artifacts are modified by manufacture and/or use, emphasizing tools useful for particular activities. The third analysis is of bone and shell which show evidence of use and/or modification. Although few in number and fragmented, these non-lithic artifacts contribute to an overall interpretation of activities at 45-DO-285. The final section of this chapter analyzes projectile point styles which are first classified by form and then discussed in relationship to site, project area and regional chronologies.

Details of methods and procedures used to develop these analyses at the Chief Joseph Dam Project are presented in the research design (Campbell 1984d). They will be re-evaluated in the synthesis report, sequel to this series of descriptive site reports.

TECHNOLOGICAL ANALYSIS

The technological analysis is composed of five dimensions: object type, material type, presence or absence of cortex, degree of breakage, and evidence of burning or dehydration. The variables of each dimension are presented in Appendix B.

Table 3-1. Zone frequencies of lithic artifacts sorted by formal category, 45-DO-285.

Artifact	Zone 1		Zone 2		Zone 3		Zone 4		Total[1]
	N	Col %	N	Col %	N	Col %	N	Col %	N
Lithic Formed Objects									
Projectile point	17	18.3	5	23.8	9	12.0	4	6.3	35
Projectile point base	15	16.1	–	–	12	16.0	7	10.9	34
Projectile point tip	12	12.9	2	9.5	7	9.3	3	4.6	24
Biface	34	36.5	11	52.4	32	42.7	38	59.4	115
Burin	–	–	–	–	1	1.3	–	–	1
Drill	2	2.2	–	–	4	5.4	3	4.6	9
Graver	3	3.2	1	4.8	1	1.3	1	1.6	6
Scraper	1	1.1	2	9.5	1	1.3	4	6.3	8
Tabular knife	8	8.6	–	–	8	10.7	4	6.3	20
Pipe	1	1.1	–	–	–	–	–	–	1
Subtotal	93	100.0	21	100.0	75	100.0	64	100.0	253
% Zone Total		0.8		0.5		0.6		0.7	
Worn/Modified Objects									
Amorphously flaked cobble	1	4.8	–	–	–	–	1	16.7	2
Amorphously flaked object	1	4.8	–	–	–	–	–	–	1
Chopper	3	14.3	–	–	1	9.1	1	16.7	5
Hammerstone	10	47.5	–	–	8	92.7	2	33.2	20
Hopper	–	–	–	–	1	9.1	–	–	1
Core	6	28.6	–	–	1	9.1	1	16.7	8
Subtotal	21	100.0	–	–	11	100.0	5	100.0	37
% Zone Total		0.2		0.0		<0.1		<0.1	
Worn/Modified/Specialized Flakes									
Flake off blade core	–	–	–	–	1	0.5	–	–	1
Burin spall	–	–	–	–	3	1.5	–	–	3
Blade	1	0.4	–	–	1	0.5	–	–	2
Linear flake	5	2.2	4	5.4	17	8.5	7	4.2	33
Resharpening flake	4	1.7	4	5.4	7	3.5	10	6.0	25
Bifacially retouched flake	17	7.4	6	8.1	19	9.5	24	14.5	66
Unifacially retouched flake	25	10.9	9	12.2	39	19.5	26	15.7	99
Utilized flake	156	67.8	51	68.9	108	54.0	94	56.6	409
Indeterminate	22	9.2	–	–	5	2.5	5	3.0	32
Subtotal	230	100.0	74	100.0	200	100.0	166	100.0	670
% Zone Total		2.0		1.7		1.5		1.7	
Lithic Debitage									
Conchoidal flake	9,861	89.5	3,970	93.9	12,196	93.5	8,830	93.2	34,857
Tabular flake	633	5.7	105	2.5	223	1.7	319	3.4	1,280
Chunk	515	4.7	154	3.6	486	3.8	316	3.3	1,471
Weathered	2	<0.1	–	–	1	<0.1	4	<0.1	7
Indeterminate	2	<0.1	–	–	1	<0.1	2	<0.1	5
Subtotal	11,013	100.0	4,229	100.0	12,907	100.0	9,471	100.0	37,620
% Zone Total		97.0		97.8		97.8		97.6	
TOTAL LITHIC	11,356	100.0	4,324	100.0	13,193	100.0	9,706	100.0	38,579

Table 3-1. Cont'd.

Artifact	Zone 1		Zone 2		Zone 3		Zone 4		Total[1]
	N	Col %	N	Col %	N	Col %	N	Col %	N
Non-Lithic Objects									
Bone bead	-	-	-	-	1	2.5	1	3.0	2
Awl	-	-	-	-	1	2.5	-	-	1
Handle[2]	-	-	-	-	-	-	2	6.1	2
Pendant	-	-	-	-	-	-	2	6.1	2
Pointed bone flake	3	2.7	1	4.3	1	2.5	-	-	5
Dentalium	-	-	-	-	2	5.0	5	15.2	7
Indeterminate bone	12	10.7	-	-	2	5.0	5	15.2	19
Ochre	97	86.6	22	95.7	33	82.5	18	54.4	170
Subtotal	112	100.0	23	100.0	40	100.0	33	100.0	208
% Zone Total		53.8		11.1		19.2		15.9	
TOTAL MATERIALS	11,468		4,347		13,233		9,739		38,787

1 Does not include <1/8" flakes
2 *Two pieces fit together.*

Material type provides the most basic categorization of the lithic assemblage. The kind of material available directly influences the kinds of tools that can be manufactured, the technique of production, and the functional performance of the implements. Selection of a material is dependent not only on availability, but also on the physical characteristics of the stone, the desired form of the implement manufactured and the task it is designed to perform. We may also detect cultural preference when one material of similar characteristics and availability is selected over another. Finally, identification of exotic lithic materials helps us to understand early patterns of trade and cultural contact.

The frequency of lithic material type by zone is presented in Table 3-2. Jasper and chalcedony are cryptocrystalline silicas formed by similar processes and sharing similar strength, flexibility and flaking characteristics (Crabtree 1967). They are available at a moderate distance from the site in the escarpments of the valley's rim. Argillite, quartzite and basalts are available on site from river gravels, although argillite is rare in the river gravels of the project area. A more likely source is the uplands east of the Columbia River and north of the Spokane River (Hibbert 1983; Appendix B). Despite low frequency, obsidian and petrified wood are noteworthy because they are also materials with no known local source. Most of the remaining materials are locally available.

Jasper, chalcedony and petrified wood have similar physical properties. Their elasticity and homogeneity cause them to flake in a predictable chonchoidal manner. Because of these similarities, they will be considered as a single group (CCS). Although argillite is less homogenous and elastic than CCS, its flaking characteristics are also predictably conchoidal. Coarse-grained quartzite tends to break along bedding planes, producing tabular rather than conchoidal flakes. The fine-grained form has some tendency to fracture conchoidally, but its flaking is less predictable and less

controllable than that of CCS and argillite. Coarse-grained basalts are similar to the coarse-grained quartzites in that neither has predictable, pronounced conchoidal fracturing characteristics. In its fine-grained form, basalt flakes much like CCS and argillite. Elsewhere on the Plateau, a reliance on fine-grained basalts to manufacture projectile points and other finely crafted implements is characteristic of early cultural phases (Leonhardy and Rice 1970).

Table 3-2. Frequency of lithic material type by zone, 45-DO-285.

Material	Zone				Total
	1	2	3	4	
Jasper	8,162	3,420	10,623	6,182	28,387
Chalcedony	1,825	380	753	790	3,748
Petrified wood	13	5	6	7	31
Argillite	336	329	1,322	2,132	4,119
Quartzite	701	122	275	357	1,455
Fine-grained quartzite	148	22	58	72	300
Basalt	66	16	55	54	191
Fine-grained basalt	31	8	19	33	91
Obsidian	9	5	21	36	71
Silicized mudstone	12	10	36	25	83
Granitic	12	2	13	5	32
Sandstone	10	3	5	9	27
Silt/mudstone	18	–	1	2	21
Steatite	3	–	–	–	3
Schist	–	–	2	3	5
Indeterminate	11	3	12	5	31
TOTAL	11,357	4,325	13,201	9,712	38,595

Zone variations in material type are indicated by comparing the relative frequencies of the largest material categories from each zone. The frequencies of fine- and coarse-grained quartzite and basalt remain fairly constant among the zones although the quartzite percentage is slightly higher in Zone 1. The most notable change in material is the gradual increase of argillite from Zone 1 to Zone 4, accompanied by a decrease in CCS.

Two parallel systems of lithic production based on material type apparently were used at 45-DO-285. Cores, specialized flakes, debitage, and to some extent, the formed objects, provide information about these systems.

The first system consists of the bifacial reduction of materials with pronounced, predictable conchoidal flaking characteristics. Sequential stage models have been developed elsewhere to describe this process of manufacture (Holmes 1919; Sharrock 1966; Muto 1971; Womack 1977; Callahan 1979). Basically, they involve the same process: the acquisition of raw materials and their reduction into increasingly refined bifacial forms until the desired product is reached (Figure 3-1). Each stage has characteristic products and by-products. Primary flakes show weathered or rind surfaces of the original exterior on all or portions of their dorsal surfaces. Secondary flakes lack cortex and show only scars of previously detached flakes on their dorsal surfaces. Predictably, cores discarded earlier in the sequence exhibit cortex while those discarded later do not. Flakes removed toward the latter portion

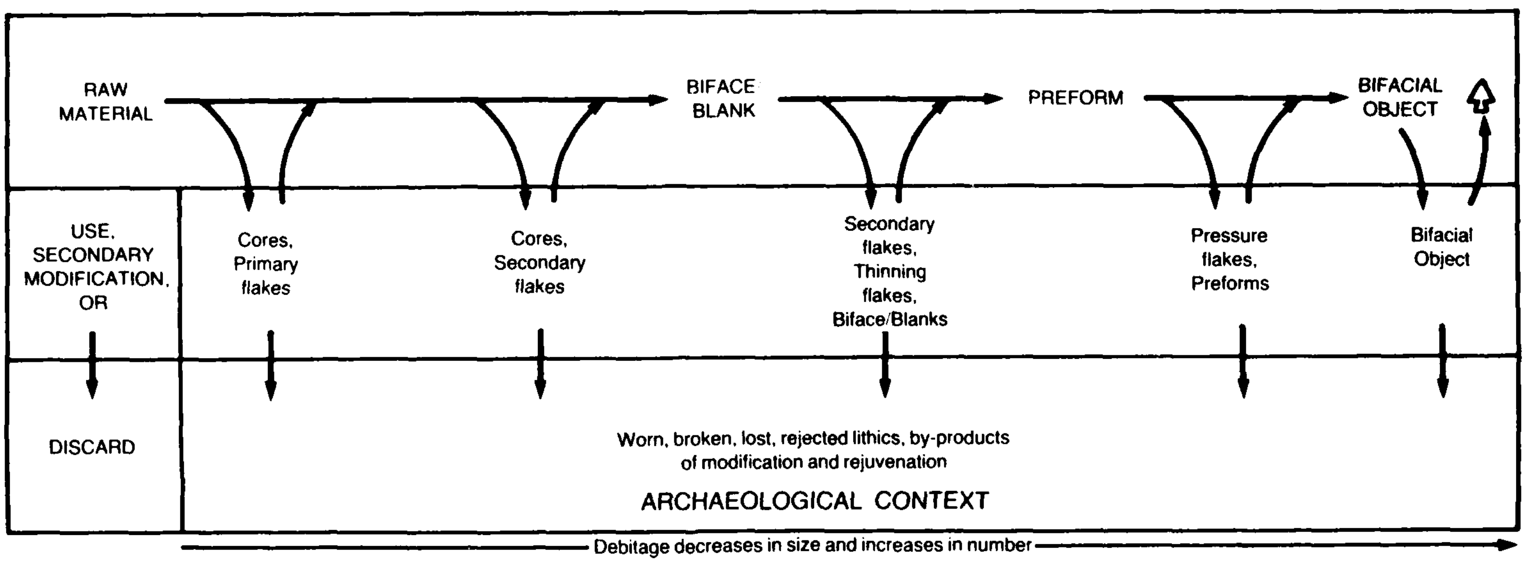


Figure 3-1. Schematic of the bifacial reduction process.

of the sequence when bifaces are formed have a diagnostic appearance. They may be recognized because the dorsal surface retains the scars from earlier secondary flake detachment, the ventral surface is smooth, and the striking platform retains a portion of the biface edge. In the final stages of manufacture, small, thin flakes are removed by the pressure technique and the desired object is formed.

The second system of reduction is similar to the first except that large flakes from locally available cobbles and the modified cobbles themselves are the desired products (Figure 3-2). It represents an indulgent system (MacDonald 1971), in which the raw material resource is so abundant locally that it is not used conservatively: extensive modification and reuse of the products in this system is less likely to occur.

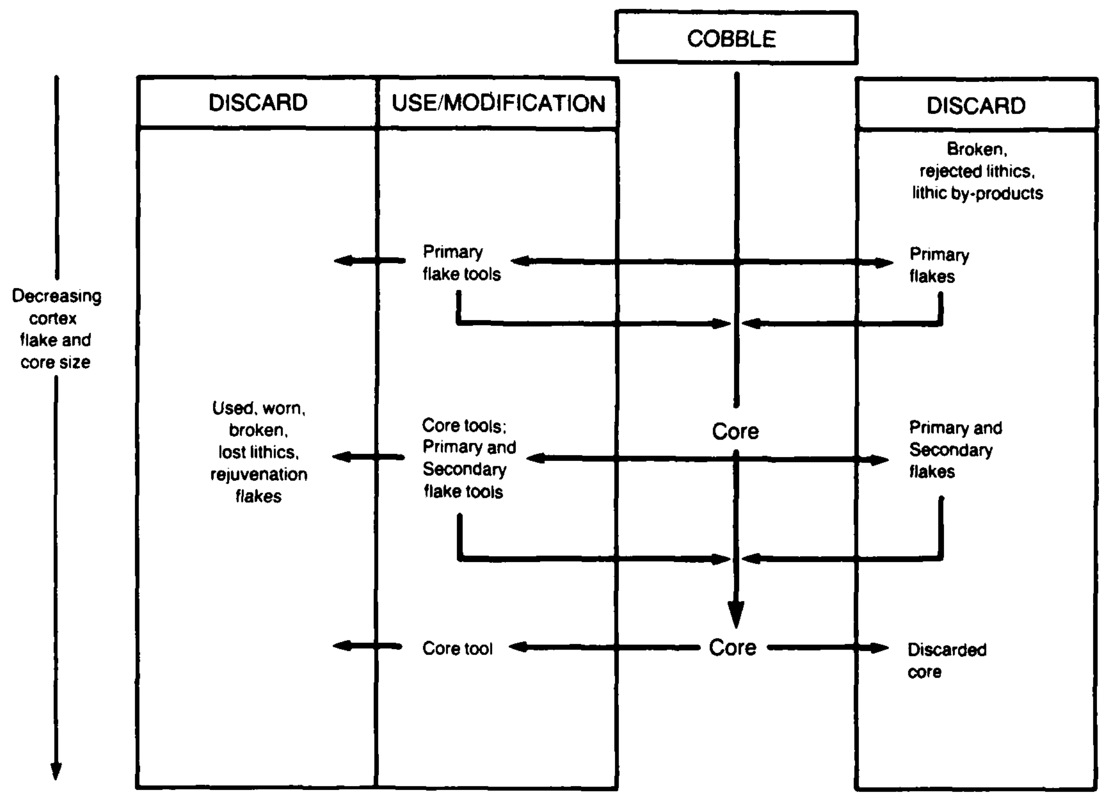


Figure 3-2. Schematic of the cobble reduction process.

During any stage of either system, the products of reduction may be modified and used, put directly to use, or discarded. Discarded items can re-enter the main sequence. Each modification results in waste flakes indistinguishable from other by-products. When worn lithics are rejuvenated, characteristic flakes, retaining the wear removed from the parent object, are

produced. In both systems, debitage tends to decrease in size and increase in number at each successive stage of reduction.

Various formal categories of artifacts used to classify the 45-DO-285 assemblage demonstrate use of both systems. Cores, bifaces, primary flakes and secondary flakes are classified by the same terms in the project area system. Preforms are classified as Type 2 in the project stylistic analysis of projectile points and linear flakes, manufactured by pressure flaking, represent final reduction. Flakes less than 1/4 in in size can also be associated with the later stages of reduction. In the project system, the classification "resharpening flakes" includes bifacial thinning flakes and flakes from tool rejuvenation. The bifacially and unifacially retouched flakes and the utilized flakes are by-products of the sequence that have been modified and/or used. Each major material assemblage at 45-DO-285 contains evidence for the use of these systems. Size attributes for the major material types are presented in Figure 3-3; kinds of debitage and percentages of primary flakes are presented in Figures 3-4 and 3-5. More descriptive statistics are included in Appendix B.

Products of the bifacial reduction system are easily recognized in the CCS assemblage (Table 3-3). In addition to the formed objects such as projectile points and bifaces, cores and all the specialized flake types occur in the assemblage. The CCS debitage is made up primarily of small conchoidal flakes, few of which retain cortex. These characteristics are relatively consistent through the four zones.

While kinds of formed objects and specialized flakes of argillite are similar to those made from CCS, no argillite cores were recovered (Table 3-4). Debitage is primarily conchoidal and displays even less cortex than CCS debitage. Conchoidal flakes are similar in size to CCS although the proportion of less than 1/4 in flakes is slightly lower for the whole argillite assemblage (Figure 3-6). The flakes tend to be broader in relation to length than CCS flakes, a characteristic shared by basalt and quartzite conchoidal flakes (Table 3-5).

The quartzite assemblage contains representatives of the first reduction system in its projectile point tip, biface, core and conchoidal flakes (Table 3-6). The remainder of the collection belongs to the second reduction system which includes minimally modified tabular knives, choppers, tabular flakes and one flaked cobble. Quartzite has a greater proportion of primary flakes than CCS or argillite. The conchoidal flakes and debitage tend to be larger. Fine-grained quartzite is distinguished from the coarse-grained variety by slightly fewer primary flakes, a smaller, slightly more elongate flake form, and more conchoidal flakes.

Data for basalt, obsidian and the remaining lithic material types have been combined in a single table because of the small sample sizes (Table 3-7). Briefly, the basalt is similar in tool types, cortex frequency and size to quartzite and the materials tend to be treated alike. In terms of the above attributes, the few pieces of obsidian most resemble the CCS assemblage. Basalt, obsidian, and the quartzites all have large standard deviations and relatively low populations for the metric data compared to CCS and argillite (Appendix B).

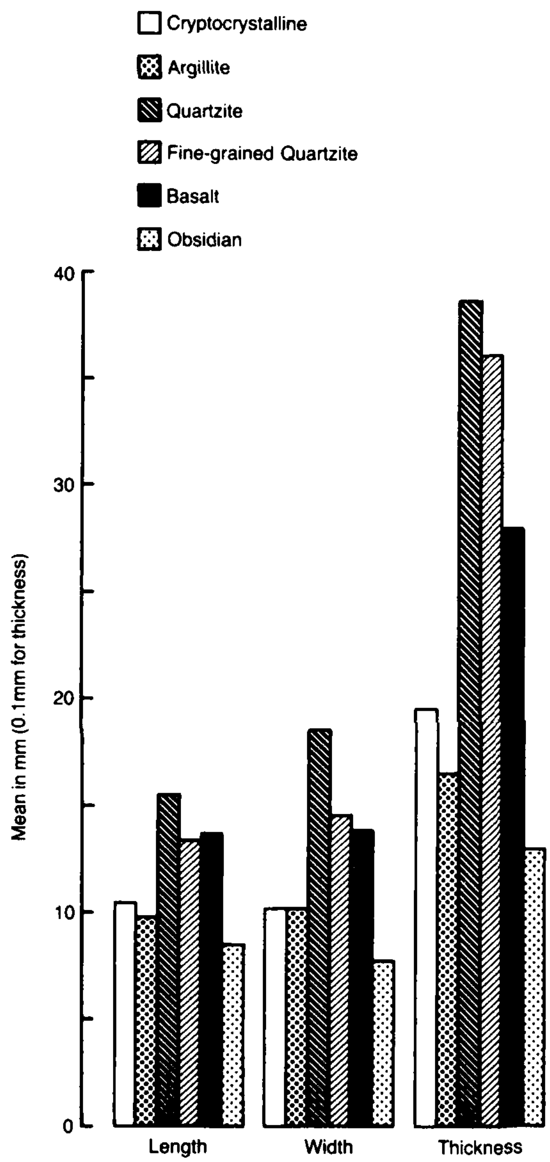


Figure 3-3. Size attributes of conchoidal flakes from major raw material categories, 45-DO-285.

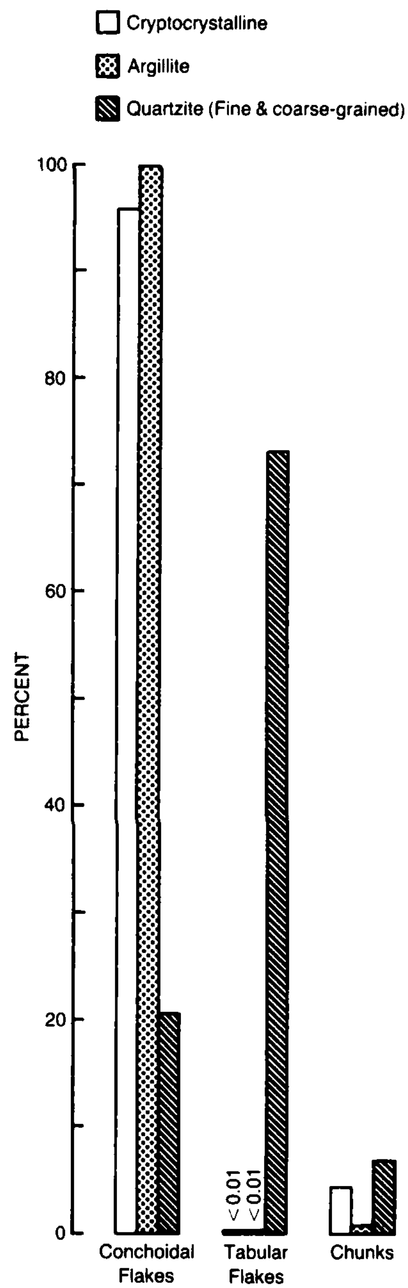


Figure 3-4. Kinds of debitage from major raw material categories, 45-DO-285.

Table 3-3. Zone frequencies of cryptocrystalline silica artifacts sorted by formal category, 45-DO-285.

Formed Objects	Zone 1	Zone 2	Zone 3	Zone 4	Total[1]
Projectile point	16	4	9	3	32
Projectile point base	14	–	12	4	30
Projectile point tip	11	2	5	2	20
Biface	30	9	28	24	91
Burin	–	–	1	–	1
Drill	2	–	3	3	8
Graver	3	1	1	1	6
Scraper	–	2	1	4	7
Subtotal	76	18	60	41	195
Cores and Modified/Worn Objects					
Amorphously flaked cobble	–	–	–	1	1
Amorphously flaked object	1	–	–	–	1
Core	5	–	1	1	7
Subtotal	6	–	1	2	9
Worn/Modified/Specialized Flakes					
Flake off blade core	–	–	1	–	1
Burin spall	–	–	3	–	3
Blade	1	–	1	–	2
Utilized flake	148	50	104	83	385
Unifacially retouched flake	25	9	38	22	94
Bifacially retouched flake	16	6	18	21	61
Resharpening flake	4	3	7	9	23
Linear flake	5	4	15	6	30
Indeterminate	1	–	1	2	4
Subtotal	200	72	188	143	603
TOTAL	282	90	249	185	806

[1] Does not include <1/4 in flakes and unassigned lithic objects.

Table 3-4. Zone frequencies of argillite artifacts sorted by formal category, 45-DO-285.

Formed Objects	Zone 1	Zone 2	Zone 3	Zone 4	Total[1]
Projectile point	1	1	–	1	3
Projectile point base	1	–	–	3	4
Projectile point tip	1	–	2	–	3
Biface	2	2	4	11	19
Drill	–	–	1	–	1
Subtotal	5	3	7	15	30
Worn/Modified/Specialized Flakes					
Utilized flake	3	1	2	8	14
Unifacially retouched flake	–	–	–	4	4
Bifacially retouched flake	1	–	1	1	3
Resharpening flake	–	1	–	1	2
Linear flake	–	–	1	1	2
Subtotal	4	2	4	15	25
TOTAL	9	5	11	30	55

[1] Does not include <1/4" in flakes and unassigned lithic objects.

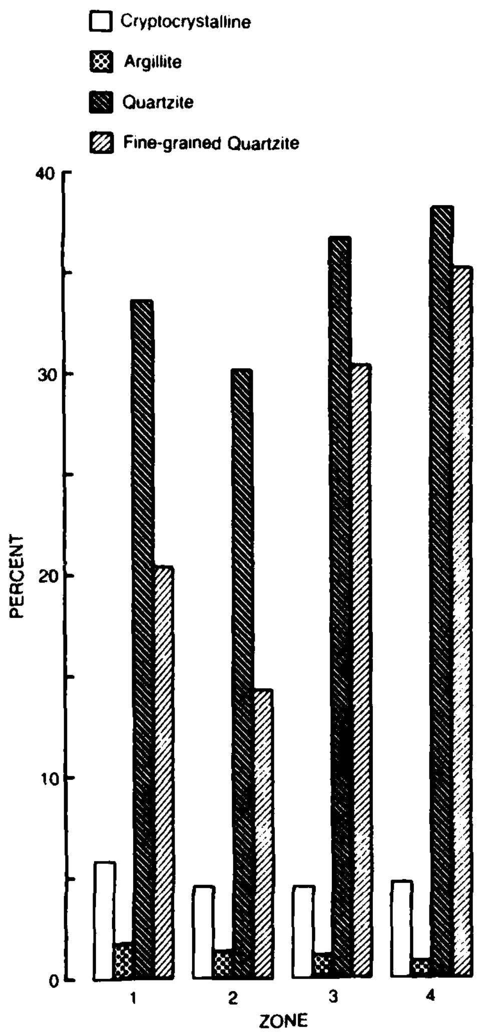


Figure 3-5. Percentage of primary flakes from major raw material categories, 45-DO-285.

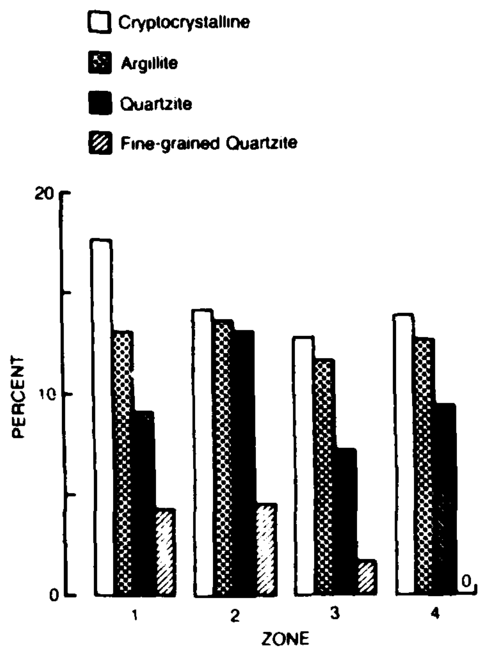


Figure 3-6. Percent of debitage less than 1/4 inch in size from major raw material categories, 45-DO-285.

Table 3-5. Length to width ratios of conchoidal flakes from the major raw material categories, 45-DO-285.

Material	Zone				Total
	1	2	3	4	
Cryptocrystalline	1.04	1.02	1.02	1.04	1.02
Argillite	1.00	1.02	0.97	0.93	0.96
Quartzite	0.82	1.02	0.87	0.75	0.83
Fine-grained quartzite	0.84	1.05	0.79	1.33	0.91
Basalt	0.98	0.89	1.07	0.97	0.99
Obsidian	0.80	-	1.04	1.16	1.18

Table 3-6. Zone frequencies of quartzite artifacts sorted by formal category, 45-DO-285.

Artifact	Zone				Total
	1	2	3	4	
Formed Object					
Projectile point tip	-	-	-	1	1
Biface	1*	-	-	-	1
Tabular knife	2*/6	-	8	4	20
Subtotal	9	-	8	5	22
Worn/Modified Objects					
Amorphously flaked cobble	1	-	-	-	1
Chopper	1	-	-	1	2
Core	1*	-	-	-	1
Subtotal	3	-	-	1	4
Worn/Modified/ Specialized Flakes					
Utilized flake	1*/1	-	-	1*	3
Subtotal	2	-	-	-	3
TOTAL	14	-	8	7	29

* Fine-grained quartzite.

Table 3-7. Zone frequencies of basalt, obsidian and other material artifacts sorted by formal category, 45-DO-285.

Artifact	Material	Zone 1	Zone 2	Zone 3	Zone 4	Total
Formed Object						
Biface	Basalt	–	–	–	2	2
Biface	Obsidian	1	–	–	1	2
Scraper	Basalt	1	–	–	–	1
Pipe	Other*	1	–	–	–	1
Subtotal		3	–	–	3	6
Worn/Modified Objects						
Amorphously flaked cobble	Granitic	–	–	–	1	1
Chopper	Basalt	1	–	1	–	2
	Granitic	1	–	–	–	1
Hammerstone	Basalt	3	–	1	1	5
	Granitic	7	–	7	1	15
Hopper mortar	Basalt	–	–	1	–	1
Milling stone	Granitic	–	–	–	1	1
Subtotal		12	–	10	3	25
Worn/Modified/Specialized Flakes						
Linear flake	Obsidian	–	–	1	–	1
Bifacially retouched flake	Basalt	–	–	1	–	1
	Granitic	–	–	1	–	1
Unifacially retouched flake	Other	–	–	1	–	1
Utilized flake	Basalt	2	–	–	1	3
	Obsidian	1	–	1	1	3
	Other	–	–	1	–	1
Indeterminate	Basalt	–	–	1	–	1
	Granitic	–	–	–	1	1
	Other*	21	–	1	2	24
	Indeterminate	–	–	1	–	1
Subtotal		24	–	9	5	38
TOTAL		36		19	8	63

* Other = silicized mudstone, sandstone, silt/mudstone, steatite, schist.

The condition and treatment of the materials, the final dimensions of the technological analysis, are uniform among the zones. The data shows that the assemblage is made up primarily of broken lithics (Figure 3-7). Over 96% of the artifacts show no burning or dehydration (Appendix B).

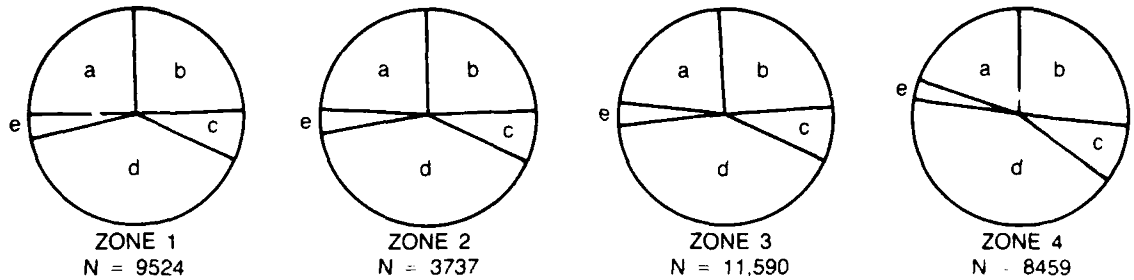


Figure 3-7. Count of condition of all lithics by analytic zone, 45-DO-285; a = complete, b = proximal fragment, c = proximal flake, d = broken, e = indeterminate/NA.

The most pronounced characteristic of the lithic assemblage from site 45-DO-285 is the emphasis placed on the conchoidally fracturing materials. The CCS and argillite assemblages represent the latter portions of the bifacial reduction sequence. In addition to the bifacial products, the assemblages show little cortex, small reworked cores, linear and bifacial thinning flakes, extensive reuse of flake by-products, and small debitage size. In the case of the CCS, we must temper this interpretation with information about the raw material. The nodules of locally available CCS generally lack weathered surfaces which influences the identification of primary flakes. The nodules yield small pieces of workable CCS often surrounded by less desirable opal material. The opal tends to fracture conchoidally but is brittle and inadequate for many tool types. In 1979, when the lithic analysis was completed at 45-DO-285, opal was not classified as a separate material. However, analysts' notes repeatedly mention that opal was found in significant numbers in the upper levels of 12 units. Re-analysis of the CCS lithic material would be required to determine if this material actually represents earlier stages of manufacture.

The small size of the remaining desirable CCS material from the nodules and the assemblage itself suggest that special techniques, varying from the basic scheme, were used in the bifacial lithic reduction. The assemblage does not contain evidence of bifaces of increasingly smaller size and more refined workmanship derived from primary pieces of lithic material. Nor does it contain numerous primary flakes or a series of bifacial thinning flakes decreasing in size. The bifaces and the Type 2 preforms are made on flakes. Rather than reducing raw material step by step through the entire sequence until a projectile point, for example, was formed, bifacial modification of relatively large flakes into formed objects was a more efficient method of producing implements.

The technique used to produce the maximum number of usable flakes from relatively small pieces of raw material was probably bipolar, as proposed for the Lower Snake River (Flenniken 1978). With this technique a piece of primary material was placed on an anvil stone for reduction, rather than held than in the hand, and struck with a hammerstone. This method produces characteristic flakes that are flat in half section because the force passing through the core travels unobstructed into the anvil. It also produces prismatic shatter and small, tabular blanks (pieces de esquilles) suitable for further bifacial reduction (Flenniken 1978; Leaf 1979). The use of this technique cannot be confirmed with the present analysis. Re-examination of the debitage would be required to identify characteristic flakes, shatter and cores.

The argillite assemblage, with fewer primary flakes and no cores, may be more characteristic of later reduction stages than the CCS. If the raw material is indeed to be found on-site in the gravel bar deposits, then there is a remarkable lack of representativ by-products from the early manufacture stages. The lack of cores and primary debitage suggests initial reduction at another nearby location or that material was imported in a form requiring only secondary reduction.

The technological systems employed at 45-DO-285 do not vary much among zones nor do artifacts designed for particular tasks vary much in material type. Concholdally fracturing materials were consistently used to produce finely flaked items, while only a few are of quartzite or basalt. Quartzite was used primarily for tools requiring minimal modification, such as choppers and tabular knives. Likewise, basalt and granite were used for choppers, hammerstones and for the hopper mortar base.

The most pronounced contrast among the zones remains the increased frequency of argillite in the lower zones. From the analysis, it appears that selection of this material was due to cultural preference rather than material characteristics.

FUNCTIONAL ANALYSIS

The functional analysis of lithic artifacts from 45-DO-285 provides basic descriptive information on characteristics and modifications associated with manufacture and use. Manufacture specific dimensions include indications of utilization and modification as well as manufacture type and its disposition. Seven dimensions are specific to each worn area on an object: condition of wear, the relationship between wear and manufacture, wear type, location, area shape, and orientation, and the edge angle at the wear location. The variables of the dimensions are presented in Appendix B.

The functional analysis presented here does not exhaustively identify or quantify the activities which took place at 45-DO-285, but it does indicate kinds of tasks undertaken by the occupants. When applied to the traditional descriptive categories, functional analysis can refine object classification and interpretation.

Various investigators have documented and described complexes of wear attrition and edge angle associated with specific functions both ethnographically and experimentally (e.g., Frison 1968; Wilmsen 1970; Gould et al. 1971; Gould and Quilter 1972; Hayden and Kamminga 1973; Wylie 1975). While it would be difficult to correlate the present analysis directly with the observations in the literature because of different methods of quantification and selection of variables, some indication of general functions may be derived from this data. Table 3-8 presents general correlations and variables of wear.

Table 3-8. Variables of wear and implied functions[1].

General Activity	Specific Function	Materials Modified	Associated Edge Angle (degrees)	Typical Wear Traces
Scraping	Soft Scraping	Hide	50-80	Smoothing; edge and unifacial
	Hard Scraping	Wood, Bone	70-90	Hinged and feathered chipping, smoothing; edge and unifacial
Cutting	Carving	Hide, Flesh Wood	30-60	Feathered chipping and smoothing; bifacial
	Sawing	Wood, Bone	20-70	
Percussion	Chopping	Wood, Bone	60-90	Hinge chipping and crushing; edge and bifacial
	Pounding	Wood, Bone Stone, Shell	N/A	Crushing, pecking; surface
Penetration	Drilling	Wood, Bone Stone, Shell	N/A	Hinged and feathered chipping, smoothing; opposing unifacial and point
	Awling	Hide	N/A	Feathered chipping, smoothing; bifacial and point
	Projectile Impact	Hide, Bone Soil, Stone	N/A	Tip burination, striations, hinge fracture.

[1] Adapted from Wylie 1975:Figure 2, Figure 19.

The kinds, locations and intensity of detectable wear traces are dependent on the mode of use, the material the tool is made from, the character of the tool edge, the nature of the material worked, and the presence or absence of abrasive agents (Hayden and Kamminga 1973:6). These traces are not directly comparable as quantifications of the tasks performed because tool material types, tool forms, and functional activities all influence the number and kinds of traces resulting from use (Wylie 1975). A host of other factors, including weathering, manufacturing and rejuvenating practices, multiple use for different tasks, recovery processes, and post-recovery accidents complicate wear detection and functional interpretation.

Just as no single wear trace is clear evidence of function, neither is edge angle alone diagnostic of a particular task. The shear and tensile strength of the tool material in relation to the force and angle of

application, the artifact form, and the hardness of the material being worked are also key factors. The optimal tool edge angle is "a compromise between worked material hardness and the ability of the tool to withstand stress" (Wilmsen 1974:91). Cryptocrystallines, for example, are stronger in compression than in shear or tensile strengths. This means that forces exerted into the body of the tool are absorbed without damage if the tool is thick enough at the point of force application to transmit the developed stresses. Thus, very acute angles probably were seldom used because of the fragility of such an edge. Edges with mid-range angles can transmit forces directly into the body of the tool without excessive damage, but break easily under transversely applied loads. More obtuse angles are able to absorb shear stresses as well as compression (Wilmsen 1974:92).

In the subsequent discussion, some variables of the wear dimensions have been combined to create larger category populations and because they are the result of similar activities. A single category represents variables of smoothing, polishing and abrasion; a second single category includes all crushing variables. All variables involving point modification also have been combined. Two categories were created by combining variations of convex and concave wear dimensions. The original variables are presented in Appendix B.

The following discussion is intended to characterize the assemblage and to highlight contrasts among the zones. It examines each formal artifact type in the same terms. Thus we can trace the generalized pattern to association with a specific kind of implement. This process is of value if, for example, we have two formal categories which occur with different zonal frequencies displaying similar complexes of wear variables. Morphological or technological attributes of the implements might in this case help us to discern different activities not immediately apparent from the similarity of the wear complexes.

Over 97% of the lithic assemblage from 45-DO-285 is unmodified debitage from the manufacturing processes. The remaining objects are almost equally divided between worn artifacts and items displaying manufacture and/or wear (Figure 3-8). Zone 2 shows a slightly higher proportion of worn only objects but also has the smallest sample size. Zones 3 and 4 show slightly higher proportions of manufactured and manufactured and worn objects in comparison to Zone 1. The type of manufacture is limited to chipping which partially modifies the object (Figure 3-9). Zone 4 shows the lowest proportion of totally modified objects. When wear occurs on modified artifacts, it most often totally or partially overlaps the manufacture (Figure 3-10). There is a small percentage of artifacts with wear occurring opposite to or independent of the manufacture suggesting tool backing.

Feathered chipping is by far the most common kind of wear (Figure 3-11). Hinged chipping is the next most common, followed by smoothing. Crushing composes only a small amount of the wear and does not occur at all in Zone 2. Slight variations in the proportion of the kinds of wear occur among the zones. Notably, the proportion of feathered chipping remains fairly constant while the other categories change.

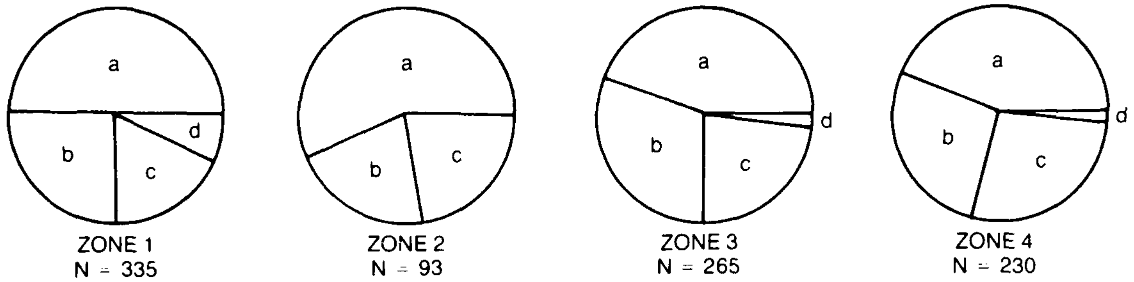


Figure 3-8. Count of utilization/modification of lithic artifacts by analytic zone, 45-DO-285; a = wear only, b = manufacture only, c = wear and manufacture, d = indeterminate.

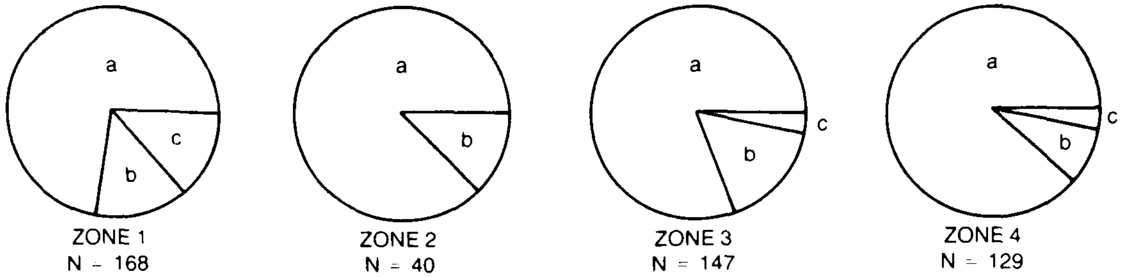


Figure 3-9. Degree of manufacture modification by analytic zone, 45-DO-285; a =partial, b = total, c = indeterminate.

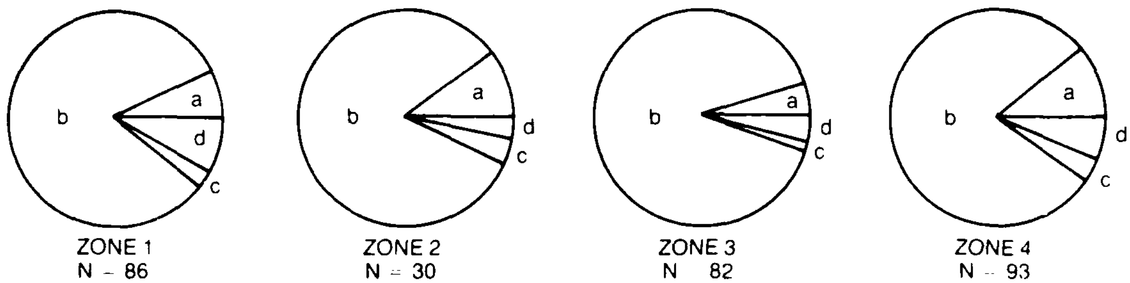


Figure 3-10. Relationship of wear and manufacture by analytic zone, 45-DO-285; a = independent, b = overlap-total, c = overlap-partial, d = independent-opposite.

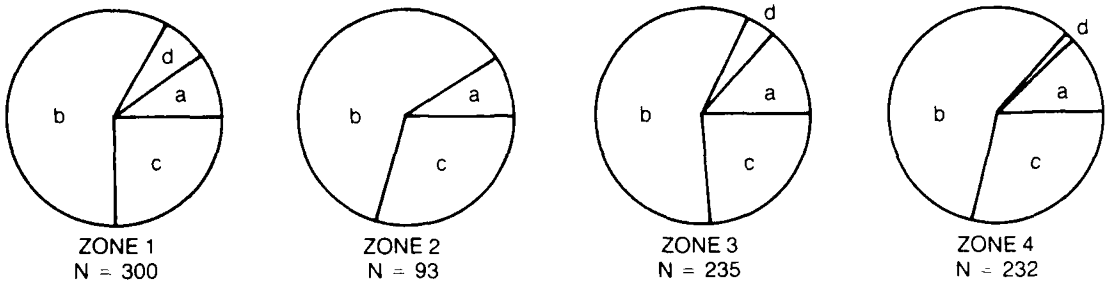


Figure 3-11. Frequency of kinds of wear by analytic zone, 45-DO-285; a = smoothing, b = feathered chipping, c = hinged chipping, d = crushing.

Feathered and hinged chipping occur primarily unifacially (Figure 3-12). Smoothing is most diverse in its locations, occurring most frequently unifacially and, in only slightly lower frequencies, on edges alone and bifacially. Smoothing is the most common wear trace on points. Crushing is limited almost entirely to terminal surfaces, but is found occasionally on an edge or other surface.

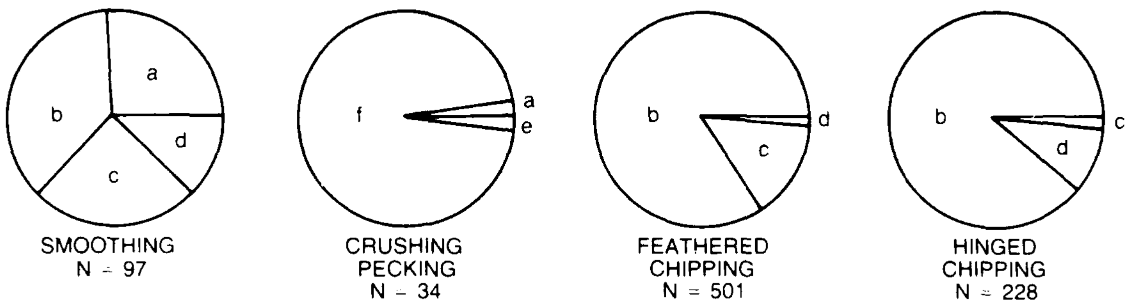


Figure 3-12. Kinds of wear by location, 45-DO-285; a = edge only, b = unifacial edge, c = bifacial edge, d = point, e = surface.

The association of kind of wear with the shape of the worn location is presented in Figure 3-13. Hinged or feathered chipping generally is associated with straight or convex worn areas. Smoothing and crushing are more frequently found on convex areas than the other two kinds of wear. Smoothing also appears on straight areas and points but rarely on concavities. Crushing occurs on straight and concave areas.

Feathered chipping is associated with more acute edge angles, the most common frequencies of which are from 11 to 30 degrees (Figure 3-14). Only 14.6% of the edge angles associated with this kind of wear are greater than 50 degrees. In contrast, hinged chipping, while found on similar locations and similarly shaped areas, is associated with steeper angles, the greatest frequencies occurring between 41 and 60 degrees. Only 22.4% of the hinge chipped edge angles are less than 31 degrees. Smoothing holds an intermediate position between feathered and hinged chipping wear. Its greatest frequency is found in the 31 to 50 degree range. The tendency outside of this mode is

for steeper angles with over a third of all the angles greater than 50 degrees. Crushing is limited almost entirely to surfaces, so edges and their angles do not apply to this discussion.

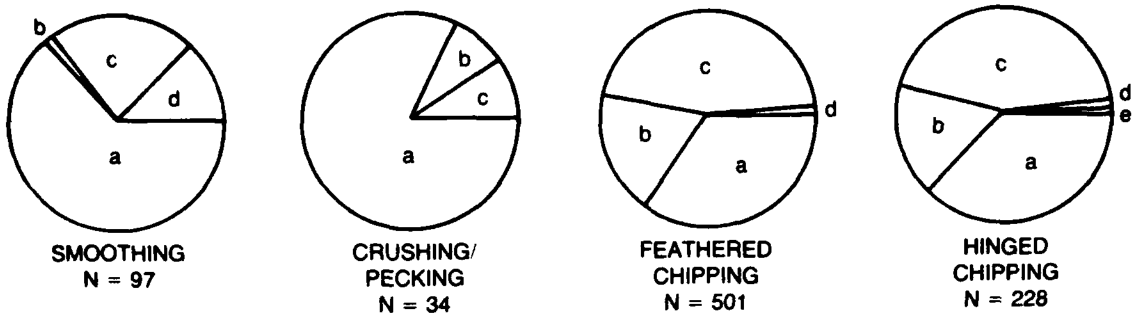


Figure 3-13. Shape of worn location associated with kinds of wear, 45-DO-285; a = convex, b = concave, c = straight, d = point, e = irregular.

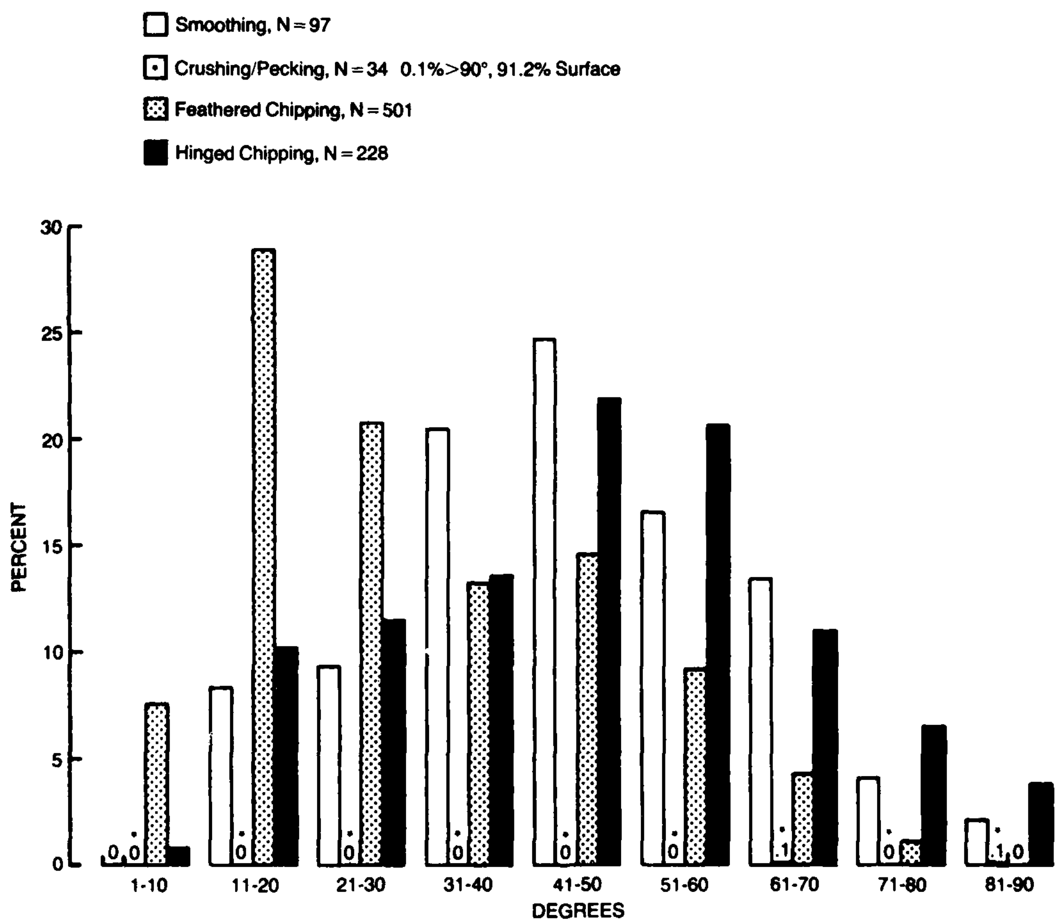


Figure 3-14. Relative frequency of kinds of wear associated with edge angle, 45-DO-285.

Most of the wear is oriented perpendicular to the edge. Less than 3% of the wear has oblique or diffuse orientation. The condition of the wear, that is, the complete or fragmentary state of the wear location and its complex of variables, was also recorded. Over 60% of the wear locations were determined to be complete.

The intent of manufacture to modify the characteristics of a lithic object is apparent when wear and wear/manufacture are correlated with edge angle (Figure 3-15). Manufactured items show steeper edge angles than unmodified, worn objects.

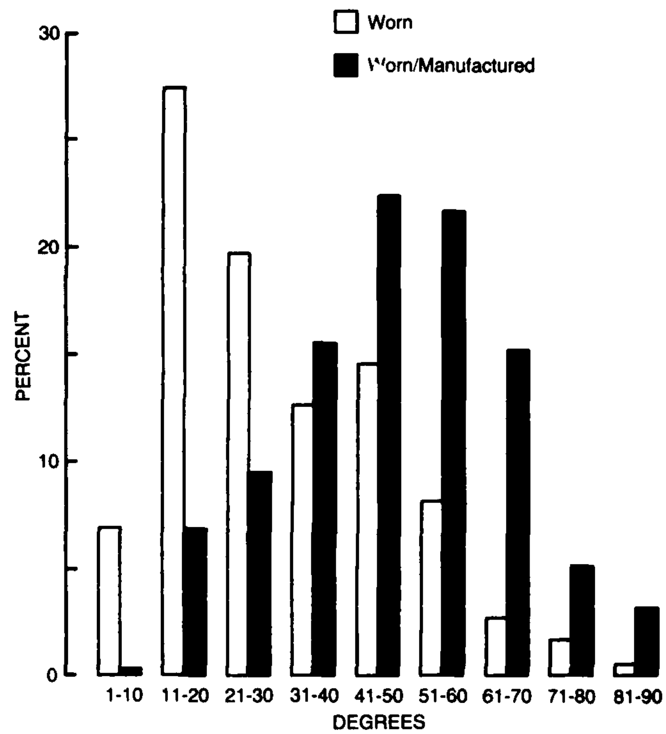


Figure 3-15. Relative frequencies of worn only and worn and manufactured location in relation to edge angle, 45-DO-285.

The relationship of kinds of wear to manufacture also increases understanding of how tools might have been used (Figure 3-16). Manufactured items show greater portions of hinged chipping and smoothing. While these associations may be attributed to use, it is likely that some are the result of manufacture. Hinged chipping, in particular, is known to result from platform preparation and flake detachment, especially where a broad-edged percussor is applied. Misadventure (accidently stepping on a tool, for instance) is another common source of edge damage (e.g., Flenniken and Haggarty 1979).

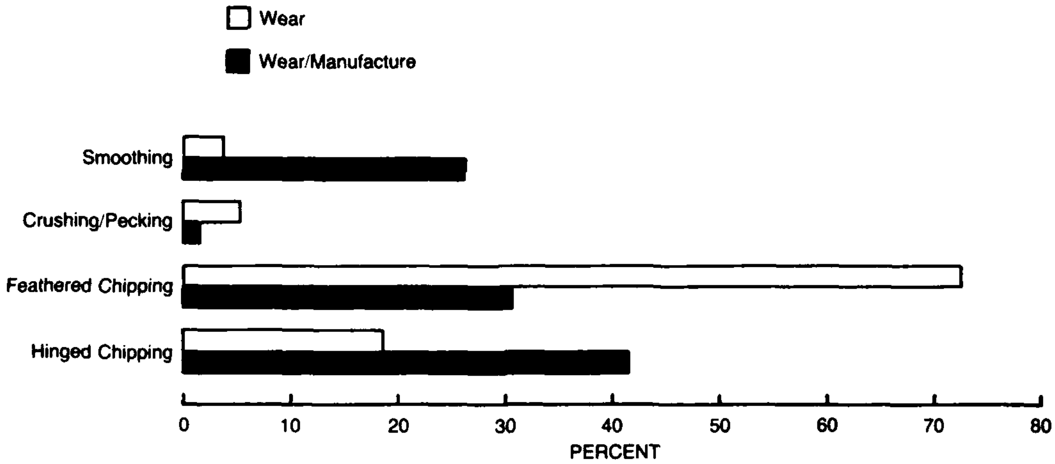


Figure 3-16. Relative frequencies of kinds of wear in relation to worn only and worn and manufactured locations, 45-DO-285.

With the characteristics of the site assemblage in mind, we may examine traditional lithic artifact definitions from the perspective of the functional data. Table 3-9 presents the frequency of worn object types by zone. Zone 2 stands out because of its low percentage of wear. Again, the small comparative sample size most likely is responsible, since within the zone assemblage itself, the percentage of worn artifacts is similar to that of other zones. Zone 1 has the greatest percentage of worn objects. Because of their small numbers, it is difficult to form interpretive statements from the object type zone distribution beyond noting their frequencies.

Table 3-10 presents the ratios of the number of wear locations to the number of object types. This figure indicates the general degree of use of a class of artifacts without implying function and the degree to which functional attributes influence classification. Bifaces, linear flakes and cores, all objects whose definitions are more closely associated with morphology and the manufacturing system, show relatively low ratios. Projectile points also have a relatively low ratio because they are associated with a single function and are easily recognized. Drills, resharpening flakes, bifacially retouched flakes and choppers have mean ratios of less than one, indicating that they depend strongly on morphology for definition. The ratio of 1.00 may reflect low object type frequency or the use of a single function for definition as in the case of the burin and the hopper mortar base. Ratios greater than 1.00 reflect the presence of several tools on single objects. This may indicate that an object has been used for several tasks, or has traces that do not result directly from a task as in the case of hafting wear. The high ratios for hammerstones, unifacially retouched flakes, and utilized flakes reflect a tendency to use these tools repeatedly or for several tasks.

Table 3-10. Ratios of number of locations to number of object types by zone, 45-DO-285.

Object Type	ZONE 1			ZONE 2			ZONE 3			ZONE 4			TOTAL		
	OBJ	LOCS	L/O	OBJ	LOCS	L/O	OBJ	LOCS	L/O	OBJ	LOCS	L/O	OBJ	LOCS	L/O
Projectile point[1]	44	9	0.20	7	6	0.86	28	11	0.39	14	3	0.27	93	29	0.31
Biface	34	10	0.29	11	3	0.27	32	10	0.31	38	12	0.32	115	35	0.30
Burin	-	-	-	-	-	-	1	1	1.00	-	-	-	1	1	1.00
Drill	2	2	1.00	-	-	-	4	3	0.75	3	3	1.00	9	8	0.89
Graver	3	3	1.00	1	2	2.00	1	1	1.00	1	1	1.00	6	7	1.17
Scraper	1	1	1.00	2	3	1.5	1	2	2.00	4	8	2.00	8	14	1.75
Tabular knife	8	9	1.13	-	-	-	8	11	1.38	4	4	1.00	20	24	1.20
Chopper	3	2	0.67	-	-	-	1	1	1.00	1	-	-	5	3	0.60
Hammer	10	18	1.8	-	-	-	8	9	1.13	2	2	1.00	20	29	1.45
Hopper	-	-	-	-	-	-	1	1	1.00	-	-	-	1	1	1.00
Core	6	2	0.33	-	-	-	1	-	0.00	1	1	1.00	8	3	0.38
Linear flake	5	3	0.60	4	2	0.50	17	3	0.18	7	2	0.29	33	10	0.30
Resharpening flake	4	3	0.75	4	2	0.50	7	3	0.43	10	9	0.90	25	17	0.68
Bifacially retouched flake	17	7	0.41	6	5	0.83	19	7	0.37	24	22	0.92	66	41	0.62
Unifacially retouched flake	25	36	1.44	9	9	1.00	39	32	0.82	26	33	1.27	99	110	1.11
Utilized flake	156	195	1.25	51	61	1.20	108	140	1.30	94	132	1.40	409	528	1.29
TOTAL	318	300	0.94	95	93	0.98	276	235	0.85	229	232	1.01	918	860	0.94

1 Includes projectile point tips, bases, whole points.

Table 3-9. Frequency of worn specimens by object type by zone[1], 45-DO-285.

Object Type	Zone 1 N	Zone 1 %	Zone 2 N	Zone 2 %	Zone 3 N	Zone 3 %	Zone 4 N	Zone 4 %	Total N	Total %
Projectile point	3	17.6	3	60.0	2	22.2	–	0.0	8	22.9
Projectile point base	3	20.0	–	0.0	3	25.0	–	0.0	6	17.6
Projectile point tip	2	16.7	–	0.0	1	14.3	2	66.7	5	20.8
Biface	6	17.6	2	18.2	7	21.9	10	26.3	25	21.7
Burin	–	0.0	–	0.0	1	100.0	–	0.0	1	100.0
Drill	2	100.0	–	0.0	3	75.0	3	100.0	8	88.9
Graver	3	100.0	1	100.0	1	100.0	1	100.0	6	100.0
Scraper	1	100.0	2	100.0	1	100.0	4	100.0	8	100.0
Tabular knife	7	87.5	–	0.0	8	100.0	4	100.0	19	95.0
Chopper	2	66.7	–	0.0	1	100.0	–	0.0	3	60.0
Hammerstone	10	100.0	–	0.0	8	100.0	2	100.0	20	100.0
Hopper mortar	–	0.0	–	0.0	1	100.0	–	0.0	1	100.0
Core	1	16.7	–	0.0	–	0.0	1	100.0	2	25.0
Blade	1	100.0	–	0.0	1	100.0	–	0.0	2	100.0
Linear flake	1	20.0	2	50.0	–	0.0	2	28.6	5	15.2
Resharpening flake	2	50.0	2	50.0	3	42.9	6	60.0	13	52.0
Bifacially retouched flake	6	35.3	4	66.7	6	31.6	15	62.5	31	47.0
Unifacially retouched flake	21	84.0	7	77.8	25	64.1	20	76.9	73	73.7
Utilized flake	156	100.0	51	100.0	108	100.0	94	100.0	409	100.0
Indeterminate	21	100.0	–	0.0	4	80.0	3	75.0	28	93.3
TOTAL	248	78.0	74	77.9	184	66.7	167	72.9	673	73.3

[1] Percentages represent proportion of total of object type.

In the subsequent discussion, the lithic artifact assemblage is divided into formal object types. Accompanying tables present kinds of wear, location of wear, and shapes of the worn locations; Table 3-11 presents edge angle data in 30 degree intervals in relation to kind and location of wear by object type. Illustrations of typical artifacts accompany the discussion.

PROJECTILE POINTS, BASES, TIPS

These artifacts will be more thoroughly discussed in the stylistic analysis and are illustrated there in Plate 3-5. Generally, they are bifacially flaked, axially symmetrical objects, lenticular to plano-convex in cross section, triangular- to lozenge-shaped in plan section, with basal modification for hafting to an arrow or dart shaft.

All of the objects included in this category may not have been intended for use as projectile points. Sub-categorization in the stylistic analysis resulted in the identification of two groups lacking basal modification. The first subcategory contains a single large triangular, finely finished object (Type 1) that seems more appropriately classified as a knife. The second group (Type 2) consists of small, triangular, finely finished forms (Plate 3-5; a and b). They represent the preform stage in the previously discussed bifacial reduction sequence.

Less than 21% of the projectile points, bases and tips display functional traces (Table 3-12). Unexpectedly, wear on points is rare, and occurs only in the form of smoothing (Table 3-13). Bifacial feathered chipping on straight

Table 3-11. Kinds of wear and locations of wear in relation to edge angle associations for all tool types, 45-DO-285.

Kind of Wear/ Location of Wear[1]	Smoothed Edge			Smoothed Unifacial			Smoothed Bifacial			Feathered Unifacial			Feathered Bifacial			Hinged Unifacial			Hinged Bifacial			TOTAL					
																						N	Row %	N	Row %	N	Row %
Edge Angle[2]	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1		2		3	
Projectile points	-	-	-	-	1	-	-	1	-	1	-	-	-	7	1	-	1	1	-	-	-	1	7.7	10	76.9	2	15.4
Base	-	-	-	-	-	-	-	-	-	-	2	1	-	-	-	-	2	1	-	-	-	-	-	4	66.7	2	33.3
Tip	-	-	-	-	-	-	-	2	-	1	-	-	2	-	-	-	2	-	-	1	-	3	44.4	5	55.6	-	-
Biface	-	-	1	-	1	1	-	6	1	1	5	1	-	-	-	-	10	4	-	1	-	1	3.1	23	71.9	8	25.0
Burin	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	100.0
Graver	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	100.0	-	-
Scraper	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	3	7	-	-	-	-	-	5	35.7	9	64.3
Tabular knife	4	15	4	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	4	16.7	15	62.5	5	20.8
Core	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	33.3	2	66.7
Blade	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	2	-	-	-	-	3	60.0	2	40.0	-	-
Linear flake	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	5	100.0	-	-	-	-
Resharpening flake	-	1	-	-	-	-	1	1	1	1	4	-	1	-	-	-	4	-	-	3	-	3	17.6	13	76.5	1	5.9
Bifacially retouched flake	-	-	-	1	2	1	-	2	2	1	7	-	1	4	1	7	5	-	5	2	-	15	36.6	22	53.7	4	9.8
Unifacially retouched flake	-	-	-	-	6	3	-	1	-	10	21	7	1	5	-	5	29	19	-	-	1	16	14.8	62	57.4	30	27.8
Utilized flake	-	-	-	5	10	1	1	3	-	250	118	15	8	10	-	33	55	10	1	5	2	298	56.5	201	38.1	28	5.3
COLUMN TOTAL	4	16	5	6	22	8	2	16	6	273	157	25	13	26	2	45	114	43	6	13	3	349	43.4	364	45.2	92	11.4
Row %	16.0	64.0	20.0	16.7	61.1	22.2	8.3	66.7	25.0	60.0	34.5	5.5	31.7	63.4	4.9	22.3	58.4	21.3	27.3	59.1	13.6						

[1] Does not include angles for point or battered surfaces. Does not include data for choppers; N = 3, all angles = 61-90°.
Does not include data for single crushed unifacial location on a unifacially retouched flake; angle = 61-90°.

[2] Edge angle codes
1 = 1 - 30°
2 = 31 - 60°
3 = 61 - 90°

Table 3-12. Wear recorded for projectile point bases and tips, 45-DO-285.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone 1	Zone 2	Zone 3	Zone 4	Total
Smoothed (33.3*)	Bifacial (22.2*)	Convex (22.2*)				2*	2*
	Point (11.1*)	Point (11.1*)			1*		1*
Feathered (50.0/44.4*)	Unifacial (50.0/22.2*)	Convex (16.7)	1				1
		Straight (33.3/11.1*)	1/1*				2/1*
	Bifacial (22.2*)	Convex (11.1*)	1*				1*
		Straight (11.1*)	1*				1*
Hinged (50.0/33.3*)	Unifacial (50.0/22.2*)	Convex (50.0/11.1*)	1		2/1*		3/1*
		Straight (11.1*)			1*		1*
	Bifacial (11.1*)	Convex (11.1*)				1*	1*
TOTAL			3/3*		3/3*	3*	6/8*

* Projectile point tip

Table 3-13. Wear recorded for projectile points, 45-DO-285.

Kind of wear (%Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone 1	Zone 2	Zone 3	Zone 4	Total
Smoothed (21.3)	Unifacial (7.1)	Convex (7.1)		1			1
	Bifacial (7.1)	Convex (7.1)	1				1
	Point (7.1)	Point (7.1)	1				1
Feathered (64.2)	Unifacial (7.1)	Straight (7.1)		1			1
	Bifacial (57.1)	Convex (35.7)	1	2	2		5
		Straight (21.4)			3		3
Hinged (14.3)	Unifacial (14.3)	Concave (14.3)		2			2
TOTAL			3	6	5	0	14

and convex locations is the most common wear complex. Hinged unifacial chipping on convex, concave and straight locations is the next most frequent, followed by feathered unifacial chipping on straight and convex locations along with smoothed bifacial convex wear. Medium edge angles are associated with the feathered bifacial and hinged unifacial wear (Table 3-11). Acute angles are the next most frequent.

Many of the traces recorded as wear probably resulted from manufacture as suggested by the relatively high proportion of bifacial damage on bifacially manufactured objects. Some of the wear may also be attributed to hafting. However, the wear and edge angle complexes also suggest some artifacts were used for light scraping and cutting.

Breakage data for projectile points also provides information about use. Fifteen of the 51 projectile points included in the stylistic analysis are complete specimens. Twenty-five of the remaining artifacts show single breaks, nine have two breaks, and two have three breaks. The most common location of breakage is the blade with the breaks oriented perpendicularly or diagonally to the long axis of the projectile point (Table 3-14). Distal blade breakage is more common than mid- or proximal blade breakage locations. Barbs and shoulders are broken diagonally or parallel to the long axis. The indeterminate categories for both variables include objects that have been reworked so that the original location and orientation of breakage has been obscured.

Table 3-14. Location of breakage and its orientation for projectile points, 45-DO-285.

Location	Orientation to Long Axis					Total
	Perpendicular	Diagonal	Parallel	Multiple	Indeterminate	
Distal blade	6	4	-	-	1	11
Mid-blade	1	2	-	4	-	7
Proximal blade	-	4	3	-	-	7
Barb or shoulder	-	4	2	-	-	6
Indeterminate[1]	1	-	-	-	10	11
Not applicable[2]	-	4	2	1	-	7
Total	8	18	7	5	11	49

1 Reworked/obscured.
2 Break includes more than one location.

It is difficult to determine what proportion of the damage to projectile points is due to impact. Diagonal and parallel breaks could result from force applied to the long axis of the object. Perpendicular breaks would result from application of lateral force to the blade. We cannot determine the context in which these forces were applied. That the blade typically receives the damage suggests that hafting protected the proximal base. This may also explain the higher proportion of mid and distal blade breakage.

The breakage analysis was applied only to projectile points complete enough to be considered for stylistic analysis. Other tips, bases and fragments were not considered. Nor are possible projectile point fragments included in the biface category taken into account.

BIFACES

This type of artifact has been mentioned in the discussion of the lithic reduction sequence. The bifaces are usually made from flakes. They are thin, lenticular in cross section, and ovate, sub-triangular or leaf-shaped in plan view (Plate 3-1; m through p). Numerous fragments in this category probably are pieces of other kinds of tools. Bifaces are distinguished from projectile points by lack of basal modification, broader width, and less refined, unpatterned or collateral flake scars. As with the projectile points, few of these objects display wear traces.

Hinged, unifacial chipping on convex and straight locations is the most common complex (Table 3-15). Bifacial smoothing on convex and straight locations is next most frequent, followed by feathered unifacial chipping also on convex and straight locations. There are minor occurrences of various other complexes. Medium edge angles are associated with the major wear complexes. Steep edge angles are next most frequent (Table 3-11).

Table 3-15. Wear recorded for bifaces, 45-DO-285.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone 1	2	3	4	Total
Smoothed (34.4)	Edge (2.9)	Convex (2.9)	1				1
	Unifacial (5.8)	Convex (2.9)				1	1
		Straight (2.9)				1	1
	Bifacial (20.0)	Convex (14.3)	1	1		3	5
		Straight (5.7)		1		1	2
	Point (5.7)	Point (5.7)	1			1	2
Crushed (2.9)	Terminal surface (2.9)	Convex (2.9)	1				1
Feathered Chipping (19.9)	Unifacial (19.9)	Convex (11.3)	1		2	1	4
		Straight (8.6)	1	1	1		3
Hinged Chipping (42.8)	Unifacial (39.9)	Convex (31.3)	3		6	2	11
		Straight (8.6)	1		1	1	3
	Bifacial (2.9)	Convex (2.9)			1		1
TOTAL			10	3	11	11	35

As with the projectile points, much of the wear recorded may be residual manufacturing traces. It also may result from including fragments of other tools in the category. The high frequency of unifacial damage and associated medium edge angles suggest scraping while bifacial smoothing suggests cutting. Point damage is evidence of occasional use for piercing.

BURIN AND BURIN SPALLS

Burins are small chisel-like implements derived from flakes, blades or other objects by removing the edge of the parent object parallel to its long axes. Generally, the burin spall is triangular in cross section. A burin spall removed from a biface edge has two planes retaining surface flake scars and a single smooth plane resulting from detachment forming a right angle with the other two planes (Plate 3-1;j,k,l). According to this analysis, wear is required on at least one end of the spall for it to be classified as a burin.

The single burin from 45-DO-285 shows feathered unifacial chipping on a convex location. The wear complex is associated with an edge angle greater than 60 degrees (Table 3-11). Both wear and angle complex are compatible with the implied function.

DRILLS

Objects in this category include artifacts that are completely bifacially modified to form a thin tip or bifacially modified projections on flakes (Plate 3-1;e,f,g). Eight locations of wear were recorded on nine artifacts, all on points. Smoothing occurs on five of them, once in Zone 1 and two each in Zones 3 and 4. Feathered chipping is found on three locations; one each in Zones 1, 3 and 4. Smoothing wear restricted to the tips suggests the drills were used to pierce softer material. If harder material were worked, hinged chipping and crushing damage to the point and adjacent edges would be the expected result.

GRAVERS

Artifacts in this category are characterized by a unifacially modified projecting tip (Plate 3-1;h,i). Gravers may be entirely modified by manufacture into the desired form, or show intentional retouch only on the bit. They were used for incising wood and bone. The most common wear is on the points which are smoothed and feather chipped: two smoothed points from Zone 1 and one with feathered chipping from Zone 2. Hinged, bifacial chipping on a convex edge was also found in Zone 2. While the wear is not incompatible with the proposed functions, more unifacial hinged chipping would be expected. Perhaps material softer than wood or bone was being worked.

SCRAPERS

Scrapers have been defined as flakes with steep, unifacial, intentional retouch forming a convex edge. The shape of the original flake and most of one surface must be altered by the modification (Plate 3-1; a,b,c). Hinged unifacial chipping on convex and straight locations is the predominate wear complex followed by unifacial smoothing on convex locations (Table 3-16). Hinged unifacial chipping on concave locations also occurs. The associated edge angles are usually greater than 60 degrees although many fall into the medium range as well (Table 3-11). The unifacial smoothing and hinged

chipping damage on convex or straight locations combined with the edge angles suggest either that scraping of both soft and harder materials was done with the tools, or that the implements were not used long enough on a soft material to develop uniform smoothing wear. The damage on concave locations suggests hafting, or scraping of pliable materials.

Table 3-16. Wear recorded for scrapers, 45-DO-285.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone				Total
			1	2	3	4	
Smoothed (28.6)	Unifacial (28.6)	Convex (28.6)	1	1		2	4
Hinged Chipping (71.4)	Unifacial (71.4)	Convex (35.7)			1	4	5
		Concave (21.4)		2	1		3
		Straight (14.3)				2	2
TOTAL			1	3	2	8	14

TABULAR KNIVES

The artifacts in this category are thin slabs with unifacial or bifacial modification of some or all edges. They are generally bi-planar in cross section and range from somewhat irregular in outline to ovate, circular, rectangular and subtriangular forms (Plate 3-2;a,b,c). They are usually manufactured from the locally available quartzite which breaks into thin, laminar pieces. Tabular objects lacking manufacture, but displaying extensive smoothed edge attrition, may also be classified as tabular knives.

As expected from the definit'on, wear recorded for tabular knives consists almost entirely of smoothing. Sixteen of the edges are convex: six in Zone 1, seven in Zone 3, and three in Zone 4. Seven are straight: two in Zone 1, four in Zone 3, and one in Zone 4. There is also bifacial smoothing of a convex edge in Zone 1. The associated edge angles cover all angle intervals with the medium range most common (Table 3-11). The wear complex supports the implied cutting function. However, the implements also may have been used as scrapers, a use supported by ethnographic data (Collier et al. 1942).

PIPE

A small semi-cylindrical piece of polished steatite has tentatively been classified as a pipe fragment (Plate 3-1;d). We believe it is the fragment of a stem rather than a bowl because of the degree of curvature. Comparison to other "tubular" specimens in the project area and in the literature support this identification (Collier et al. 1942; Crabtree 1957).

KEY	Master Number: Tool: Provenience/Level: Zone: Material:

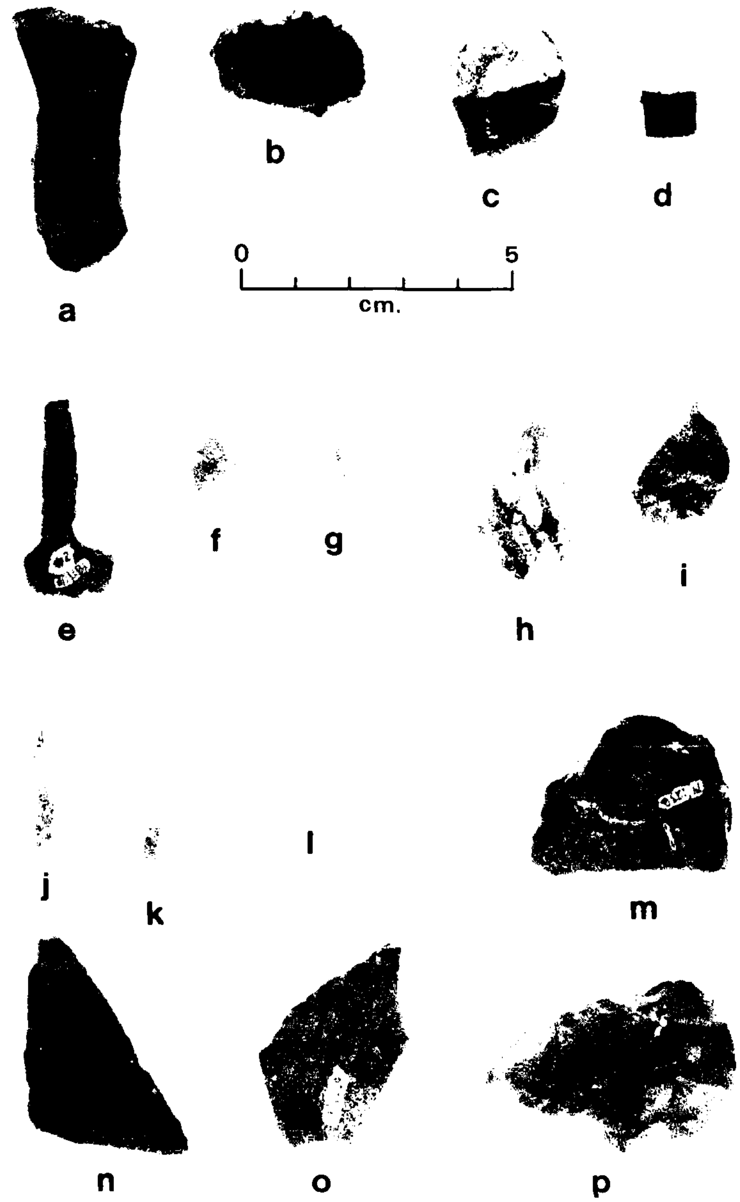
a.	b.	c.	d.	
300	1054	599	468	
Scraper	Scraper	Scraper	Pipe Fragment	
16N28W/70	13N32W/70	9N32W/170	17N32W/30	
1	2	4	1	
Fine-grained Basalt	CCS	CCS	Steatite	

e.	f.	g.	h.	i.
1181	665	1061	1215	175
Drill	Drill	Drill	Graver	Graver
15N32W/140	18N28W/60	13N32W/130	15N32W/20	6N30W/140
3	1	3	1	4
Argillite	CCS	CCS	CCS	CCS

j.	k.	l.	m.
222	870	437	1238
Burin Spall	Burin Spall	Burin	Biface
12N33W/110	12N31W/140	18N32W/120	15N32W/150
3	3	3	4
CCS	CCS	CCS	CCS

n.	o.	p.
1166	1228	173
Biface	Biface	Biface
16N32W/130	15N32W/170	15N34W/120A
3	4	Testing
Argillite	CCS	CCS

Plate 3-1. Various lithic artifacts, 45-DO-285.


a
b
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KEY

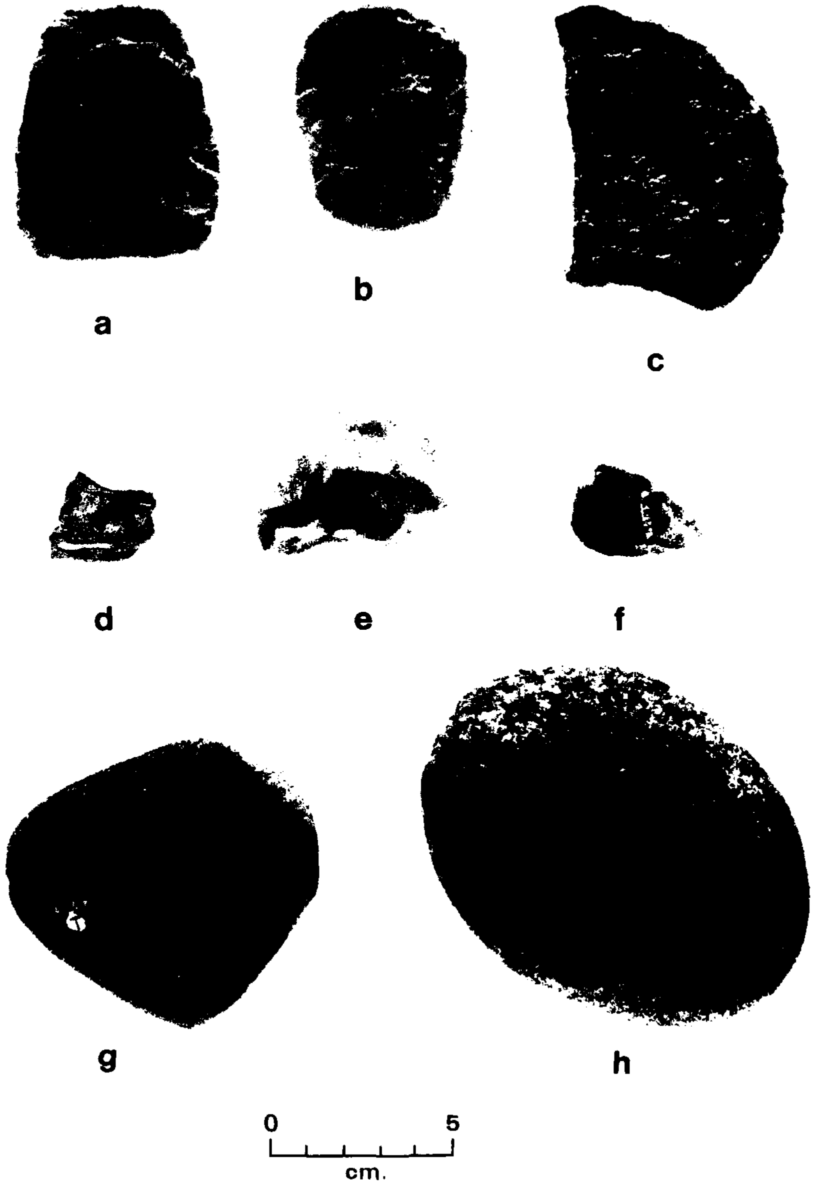
Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.
345	295	233
Tabular Knife	Tabular Knife	Tabular Knife
16N30W/140	16N28W/60	12N33W/130
3	1	3
Quartzite	Quartzite	Quartzite

d.	e.	f.
949	296	1084
Core	Core	Core
15N34W/110	16N28W/60	13N31W/150
Testing	1	4
CCS	CCS	CCS

g.	h.
398	1219
Hammerstone	Hammerstone
16N30W/50	16N30W/50
1	1
Basalt	Granite

Plate 3-2. Tabular Knives, cores and hammerstones, 45-DO-285.


a
b
c
d
e
f
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5
cm.

AMORPHOUSLY FLAKED COBBLES

These artifacts have been defined as cobbles with one or more flakes removed. The purpose of the flake detachment is unclear. One of the artifacts shows detachment of large flakes from a platform formed by splitting a quartzite cobble (Plate 3-3;b). Blows were directed into the body of the cobble causing severe step fracturing. The other artifact is a split granitic cobble with flakes removed perpendicular to the break. The flake scars and material suggest that the spalls were fragmentary and of poor quality. These objects may represent attempts to reduce a cobble into a chopper form or to produce large flakes. When used for the latter purpose, they may be regarded as cores. In both cases, either the effects of the blows or the material itself made continued reduction undesirable. Neither object displays wear traces.

CHOPPERS

Choppers are manufactured from flat, circular or ovate river cobbles by removing overlapping unifacial or bifacial flakes to form a steep angled, sharp edge (Figure 3-17). Such an edge is adequate for heavy butchering activities and carcass dismemberment. The percussive chopping activity implied by the term may be associated with the working of wood or the cutting, crushing and splintering of green bone for marrow extraction. Some investigators believe these implements are initially unifacially flaked and become bifacial from battering (Flenniken 1978).

Wear identified on choppers consists entirely of three crushed locations; one bifacial convex edge from Zone 3, one bifacial convex edge from Zone 1 and a bifacial straight edge, also from Zone 1. Wear locations are associated with angles greater than 60 degrees (Table 3-11). This wear complex supports the traditional definition. However, as wear occurs only on 60% of the artifacts, morphological characteristics also are important for classification.

HAMMERSTONES

Hammerstones are unmodified hand-sized cobbles used for percussive activities (Plate 3-2;g,h). The wear may result from pounding stone, bone or wood. Hammerstones from 45-DO-285 show crushing on convex terminal surfaces on 25 objects: 15 from Zone 1; nine from Zone 3; and one from Zone 4. Crushing on two concave surfaces from Zone 1 is due to cobble shape and functional attrition. A single crushed straight surface was also found in Zone 1.

HOPPER MORTAR BASE

Hopper mortar bases have been arbitrarily defined as large flat cobbles with concave areas of wear. Ethnographically, they were used in association with the bottomless hopper mortar basket and pestle to process food. The

single hopper mortar base in the assemblage shows crushing on a concave surface. However, the wear is not restricted to the central location and the concavity is not manufactured, but the natural shape of the cobble. This artifact may have been used to process food, but may not have been used exclusively with the basket and pestle. It could have served equally well as a support for lithic manufacture or the shattering of bone for marrow extraction.

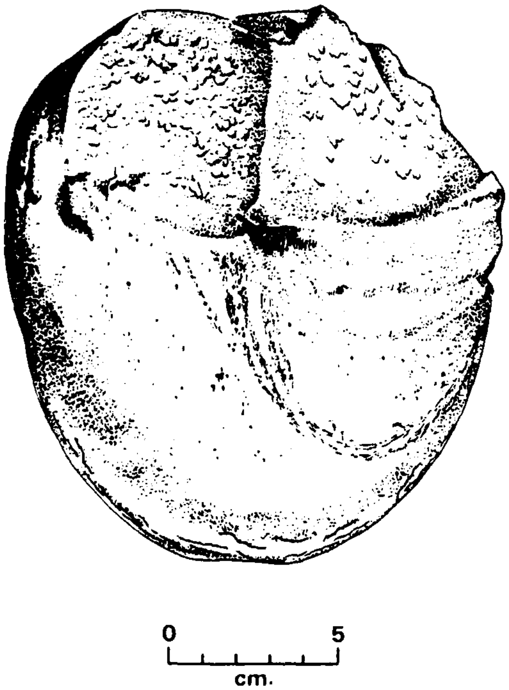

Figure 3-17. Cobble choper from 45-DO-285, 17N28W, Level 80, M#672, Zone 1.

CORES

Cores are the source of lithic material which is modified into other objects. As previously noted, a core may be diverted at any point from the reduction sequence and used as a tool if it has some characteristic suitable for the task at hand. The project classification considers an object a core if it exhibits a prepared platform with at least two flakes removed from it. As a consequence, small, fragmentary lithic pieces with only a platform remnant and truncated flake scars have been included. Some of the pieces appear to be fragments of larger objects on which post-breakage flake detachment was attempted. Several of the artifacts have multiple platforms with small, blade-like flakes removed from two or more surfaces. The platforms are not opposing, but appear to be placed wherever the bulk of the

	Master Number:
	Tool:
KEY	Provenience/Level:
	Zone:
	Material:

a.

650
Indeterminate
18N27W/170
3
Indeterminate Material

b.

672
Amorphously Flaked Cobble
17N28W/80
1
Quartzite

Plate 3-3. Indeterminate object and amorphously flaked cobble, 45-DO-285.

single hopper mortar base in the assemblage shows crushing on a concave surface. However, the wear is not restricted to the central location and the concavity is not manufactured, but the natural shape of the cobble. This artifact may have been used to process food, but may not have been used exclusively with the basket and pestle. It could have served equally well as a support for lithic manufacture or the shattering of bone for marrow extraction.

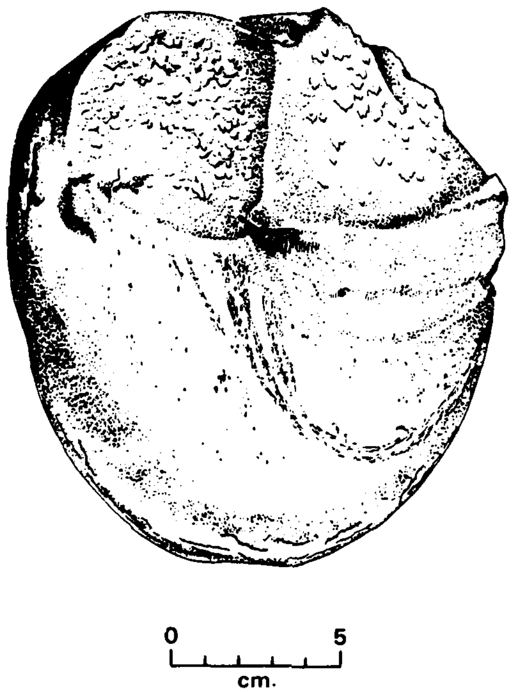

Figure 3-17. Cobble choper from 45-DO-285, 17N28W, Level 80, M#672, Zone 1.

CORES

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KEY

Master Number:
Tool:
Provenience/Level:
Zone:
Material:

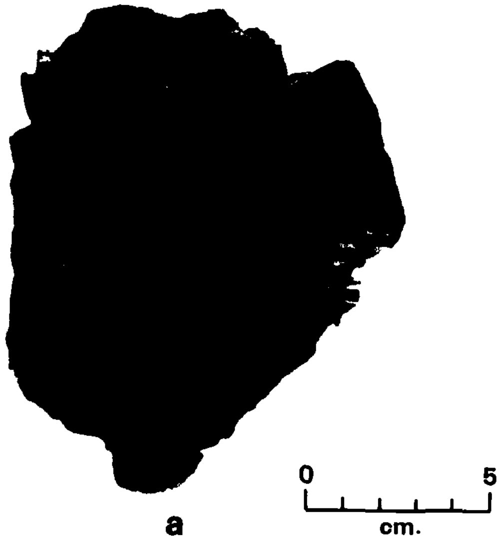
a.

650
Indeterminate
18N27W/170
3
Indeterminate Material

b.

672
Amorphously Flaked Cobble
17N28W/80
1
Quartzite

Plate 3-3. Indeterminate object and amorphously flaked cobble, 45-DO-285.



a

b

material allowed further reduction. All the cores are small, reflecting the conservative use of conchoidally flaking material at the site (Plate 3-2;d,e,f).

Wear was recorded for 25% of the cores. It consists of hinged, unifacial chipping of a convex and a straight location in Zone 4, and bifacial smoothing of a straight location in Zone 1. The hinged chipping could have resulted from manufacturing processes. The smoothing is less likely to be a product of reduction and can be attributed to casual, incidental use of the object.

FLAKE FROM A BLADE CORE

This category was defined to include flakes associated with preparation of a core for the removal of microblades. While several of the cores have blade-like flake scars, neither they nor the linear flakes recovered fit the criteria defining microblade cores and flakes (Sanger 1968, 1970).

The single object in this category is a small, linear flake, trapezoidal in cross section with evidence of platform preparation (Plate 3-4;p). It displays no functional traces.

BLADE

Blades are parallel-sided flakes with one or two parallel arrises on the dorsal surface. The flakes must be at least twice as long as they are wide and more than 1 cm in width (Plate 3-4;t,u).

Both of the blades from the site are worn. Three instances of feathered unifacial chipping on straight locations associated with acute angles were found in Zone 3. Unifacial hinged chipping on one convex and one straight location associated with medium angles were found in Zone 1. The blades are believed to have been used for cutting and light scraping.

LINEAR FLAKES

These flakes, like blades, are parallel-sided and twice as long as they are wide. Width, however, is restricted to less than 1 cm. This category was created to identify microblades, but linear flakes in the 45-DO-285 assemblage lack the multiple arrises, cross section, and platform angle characteristic of microblades (Plate 3-4;q,r,s). Most are small pressure flakes.

Only 15.2% of the flakes show functional traces suggesting that they represent primarily a technological category. The wear is entirely unifacial feathered chipping of straight, presumably lateral, edges associated with acute edge angles. One complex is from Zone 1 and two each are from Zones 2 and 4. Light scraping or cutting are suggested as incidental uses for these flakes.

RESHARPENING FLAKES

This category includes flakes removed from the edges of bifacially and unifacially modified implements. The original object's edge was used as the striking platform so the resulting flake retains portions of the edge and surfaces of the parent object. The term implies that resharpening flakes were detached with the intention of rejuvenating a worn location, but this is misleading because the category also includes unworn bifacial thinning flakes.

Slightly over half of the flakes show evidence of wear and the wear complexes are somewhat diverse (Table 3-17). Hinged chipping, the most common kind of wear, occurs unifacially on convex and straight locations and bifacially on convex and concave locations. Feathered chipping, the next most common kind of wear, is found unifacially on convex and straight locations and bifacially on straight locations. Smoothing, the least frequent kind of wear, is found on convex edges only and bifacially on convex locations. All of the edge angle intervals are represented (Table 3-11). Medium angles are most commonly associated with unifacial hinged and feathered chipping. Smoothing is associated with all the angle categories.

The wear complexes undoubtedly resulted from both manufacture and use. Smoothing attrition is most likely to be residual wear on the original implement from which the flake was detached. The unifacial complexes suggest that scraping was the primary use while the bifacial attrition represents secondary cutting activities as well as bifacial manufacture. It is not possible to determine if the wear is from the original object or from use of the flakes.

Table 3-17. Wear recorded for resharpening flakes, 45-DO-285.

Kind of wear [% Total]	Location of wear [% Total]	Shape of worn area [% Total]	Zone				Total
			1	2	3	4	
Smoothed [23.5]	Edge [5.9]	Convex [5.9]		1			1
	Bifacial [17.6]	Convex [17.6]			2	1	3
Feathered Chipping [35.3]	Unifacial [29.4]	Convex [11.8]	1			1	2
		Straight [17.6]		1		2	3
	Bifacial [5.9]	Straight [5.9]				1	1
Hinged Chipping [41.2]	Unifacial [23.5]	Convex [5.9]				1	1
		Straight [17.6]	2			1	3
	Bifacial [17.7]	Convex [11.8]			1	1	2
		Concave [5.9]				1	1
TOTAL			3	2	3	9	17

KEY
Master Number:
Tool:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.
1099	901	1245	1116
Point Bone Fragment Indeterminate	Indeterminate	Pendant	Pendant
13N31W/50	11N31W/70	15N32W/160	14N32W/160
1	1	4	4
Bone	Bone	Bone	Bone

e.	f.	g.	h.	i.	j.	k.	l.
799	887	1124	751	596	587	1154	1150
Bead	Dentalium	Dentalium	Dentalium	Dentalium	Dentalium	Dentalium	Dentalium
12N31W/130	11N32W/170	13N32W/160	13N33W/120	9N32W/160	10N31W/160	15N25W/200	15N26W/100
3	4	4	3	3	4	4	4
Shell	Shell	Shell	Shell	Shell	Shell	Shell	Shell

m.	n.
439	671
Utilized Flake	Unifacially Retouched Flake
17N31W/80	17N28W/70
2	1
CCS	CCS

o.	p.	q.	r.	s.
379	606	973	2	957
Indeterminate	Flakes Off Blade Cores	Linear Flake	Linear Flake	Linear Flake
16N30W/60	9N31W/120	15N34W/100	15N34W/20A	15N34W/120
1	3	Testing	Testing	Testing
Siltstone	CCS	CCS	CCS	CCS

t.	u.
483	386
Blade	Blade
18N32W/120	15N30W/40
3	1
CCS	CCS

Plate 3-4. Bone, shell and lithic artifacts, 45-DO-285.


a
b
c
d
0
5
cm.
e
f
g
h
i
j
k
l
m
n
o
p
q
r
s
t
u

BIFACIALLY RETOUCHED FLAKES

This category is composed of flakes displaying intentional bifacial modification of an edge. Slightly less than half of these flakes display wear complexes, suggesting that many are technological by-products. They also may not have been used for tasks that produce wear damage, or perhaps were not used long enough to produce detectable wear. In comparison to the resharpening flakes, the wear complexes are similarly diverse, but more centralized in frequency (Table 3-18). Hinged, unifacial chipping on straight locations is most common. Feathered, unifacial chipping on convex, straight and concave locations is next most frequent. Smoothing is least common. Edge angles are distributed among all three intervals with the greatest frequency in the medium range followed by a relatively high percentage of acute angles (Table 3-11). The medium angles are associated primarily with unifacial and secondarily with bifacial wear. The acute angles are associated primarily with hinged unifacial and bifacial wear. The steeper angles are associated with bifacial and unifacial smoothing.

Again, manufacturing processes probably are responsible for a portion of the wear detected. The prominence of unifacial hinged wear associated with medium angles suggests scraping use. Worn concavities suggest scraping of a pliable material. Bifacial attrition suggests cutting was a secondary use.

Table 3-18. Wear recorded for bifacially retouched flakes, 45-DO-285.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone 1	Zone 2	Zone 3	Zone 4	Total
Smoothed (19.5)	Unifacial (9.7)	Convex (7.3)		2		1	3
		Straight (2.4)	1				1
	Bifacial (9.8)	Convex (9.8)			1	3	4
Feathered Chipping (34.2)	Unifacial (19.5)	Convex (7.3)		1		2	3
		Concave (4.9)			1	1	2
		Straight (7.3)	1	1		1	3
	Bifacial (14.7)	Convex (4.9)	1			1	2
		Straight (9.8)	1		1	2	4
Hinged Chipping (46.3)	Unifacial (29.2)	Convex (4.9)			1	1	2
		Concave (2.4)				1	1
		Straight (21.9)	2	1	2	4	9
	Bifacial (17.1)	Convex (9.8)	1			3	4
		Straight (7.3)			1	2	3
TOTAL			7	5	7	22	41

UNIFACIALLY RETOUCHED FLAKES

These artifacts have been intentionally unifacially modified (Plate 3-4;n). Over 70% of the artifacts show wear suggesting that functional traces are less likely to have resulted from manufacture than those on resharpening flakes. Nearly half of the flakes show hinged, unifacial damage (Table 3-19). Feathered chipping is found on almost 40% of the flakes, most often unifacially on convex and straight surfaces. In contrast to the bifacially retouched flakes, there is a greater proportion of steep and medium edge angles associated with unifacial hinged and feather chipped attrition (Table 3-11).

Table 3-19. Wear recorded for unifacially retouched flakes, 45-DO-285.

Kind of wear [% Total]	Location of wear [% Total]	Shape of worn area [% Total]	Zone 1	Zone 2	Zone 3	Zone 4	Total
Smoothed [10.0]	Unifacial [8.2]	Convex [6.4]	1	1	2	3	7
		Straight [1.8]			2		2
	Bifacial [0.9]	Convex [0.9]	1				1
	Point [0.9]	Point [0.9]			1		1
Crushed [0.9]	Unifacial [0.9]	Convex [0.9]			1		1
Feathered Chipping [39.9]	Unifacial [34.5]	Convex [15.5]	3	2	7	5	17
		Concave [4.5]	1		1	3	5
		Straight [14.5]	10			6	16
	Bifacial [5.4]	Convex [4.5]	1		3	1	5
		Concave [0.9]	1				1
Hinged Chipping [49.1]	Unifacial [48.2]	Convex [16.4]	7	3	3	5	18
		Concave [13.6]	9	2	2	2	15
		Straight [17.3]	2	1	8	8	19
		Irregular [0.9]			1		1
	Bifacial [0.9]	Convex [0.9]			1		1
TOTAL			36	9	32	33	110

The unifacial wear complexes, the medium edge angles, and the near absence of bifacial damage suggest an even greater use of these artifacts for scraping than exhibited by the bifacially retouched flakes. There are also more damaged concave locations suggesting that pliable material was scraped.

With this analysis, we have no way of knowing the length of edge segments identified as single tools nor whether convex and concave locations may be sequential. Co-occurence of these two location variables on a continuous edge would suggest working of pliable media so that both concave and convex locations would develop evidence of similar attrition. The concave locations may also have resulted from the shaping and smoothing of wood and bone.

UTILIZED FLAKES

This category includes flakes which show evidence of use damage, but no sign of intentional modification (Plate 3-4;m). The flakes were probably used for any purpose for which their characteristics were suitable.

Wear complexes are the least diverse among the specialized flakes (Table 3-20). Over 70% of the flakes display unifacial feathered chipping on straight, convex or concave locations. Small frequencies of feathered chipping also occur bifacially and on points. Hinged chipping occurs on only 20% of the flakes, primarily unifacially on straight, convex or concave locations. Smoothing is rare.

Edge angles are found in all three intervals (Table 3-11). In contrast to the other specialized flakes, the acute angles are most common, followed by medium angles.

Although some of the wear probably resulted from manufacture and accidental damage, its uniformity indicates a regular function: the unifacial position and feathered chipping suggest light scraping while the acute edge angles suggest cutting. In both cases, wear on both convexities and concavities suggests that pliable material was being worked.

INDETERMINATES

Thirty-two objects were classified as indeterminate. Of these, 21 are concretions of silt and mudstone which do not occur naturally in the on-site matrices. Seven exhibit striae which appear patterned, possibly decorative. Other striae are randomly oriented and may have been acquired during recovery. The colors of the objects range from white through gray to red-brown. Two are fragments of disks. Another has obvious flaking and striations (Plate 3-4;o). The objects may have been pigment sources, decorative items or natural curiosities collected from the nearby Nespelem silt cliffs.

Two of the remaining indeterminate objects are pieces of polished steatite of uncertain functions; one is decoratively shaped (Figure 3-18). A third object is a large piece of layered black, lithic material, possibly argillite, which may be a piece of primary core material (Plate 3-3;a). However, while the stone is similar to the material of some of the argillite formed objects, its breakage characteristics seem more determined by bedding planes than for the argillite of the rest of the assemblage.

Another of the indeterminate objects is a crystocrystalline lithic fragment with a large inclusion or clast of red hematite. The hematite is classified as ochre on this project and here occurs in a natural association.

Table 3-20. Wear recorded for utilized flakes, 45-DO-285.

Kind of wear (% Total)	Location of wear (% Total)	Shape of worn area (% Total)	Zone				Total
			1	2	3	4	
Smoothed (3.8)	Unifacial (3.0)	Convex (1.5)	4		4		8
		Straight (1.3)	1		4	2	7
		Concave (0.2)			1		1
	Bifacial (0.8)	Convex (0.6)	2			1	3
		Straight (0.2)				1	1
Feathered Chipping (76.2)	Unifacial (72.5)	Convex (22.9)	49	12	30	30	121
		Concave (15.5)	22	13	24	23	82
		Straight (34.1)	67	17	50	46	180
	Bifacial (3.5)	Convex (2.7)	4	1	5	4	14
		Concave (0.2)	1				1
		Straight (0.6)	2		1		3
	Point (0.2)	Point (0.2)			1		1
Hinged Chipping (20.0)	Unifacial (18.5)	Convex (5.3)	9	5	9	5	28
		Concave (3.2)	9	4	2	2	17
		Straight (10.0)	21	9	7	16	53
	Bifacial (1.5)	Convex (0.6)	1		1	1	3
		Straight (0.9)	3		1	1	5
TOTAL			195	61	140	132	528

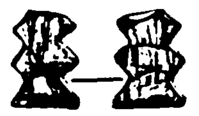


Figure 3-18. Steatite object, 45-DO-285; 12N31W/50/Zone 1/M#866.

The remaining objects include cobble and cryptocrystalline items from a cultural context. Some show modification; their significance and function is unknown.

NON-LITHIC

Artifacts included in the non-lithic analysis are presented in Table 3-1. Excluding the indeterminate bone objects, ochre and shell, the majority of the items have decorative functions. The bone and shell beads are similar in size and appearance (Plate 3-4;e). The pendants could be regarded as beads as well since they are distinguished primarily by size, but are centrally pierced (Plate 3-4;c,d). Both complete and fragmentary dentalium shells were recovered; all may have been strung (Plate 3-4;f through l).

The bone handle and awl are the only identifiable non-lithic utilitarian objects recovered (Figure 3-19;a,b). The handle is of antler and has been shaped and incised. Although the distal portion is fragmentary, we suspect that the handle was socketed to hold a stone or tooth scraper, chisel, or engraver. The awl is also incised and is manufactured from a large mammal rib.

The remaining categories of bone lack elements which might define their function. The pointed fragments could have resulted from the breakage of a variety of tools including awls, perforators, leister or hook barbs. The most complete indeterminate object is a flat section unipoint which may have served as a perforator or net shuttle (Figure 3-19;c). The remaining indeterminate bone objects are fragments of antler and bone that show various degrees of polishing, flaking, striation or grooving (Plate 3-4;a,b).

Ochre, concretions of red hematite, was presumably sought as a pigment. Most of these pieces are unmodified. Ochre has been found on various grinding implements, milling stones and other artifact types at other project area sites.

The river mussel shells are included in this analysis because they were initially thought to be perforated. Their fragmentary nature and poor preservation make it difficult to know if they were modified. They do represent the only river mussel shell from a site where shellfish processing was not an economic activity.

Distribution of the non-lithic artifacts shows differences among the zones. Most of the non-ochre material occurs in Zone 1 or Zone 4. All of the decorative objects, the awl and the handle are found in Zone 3 or 4 while the

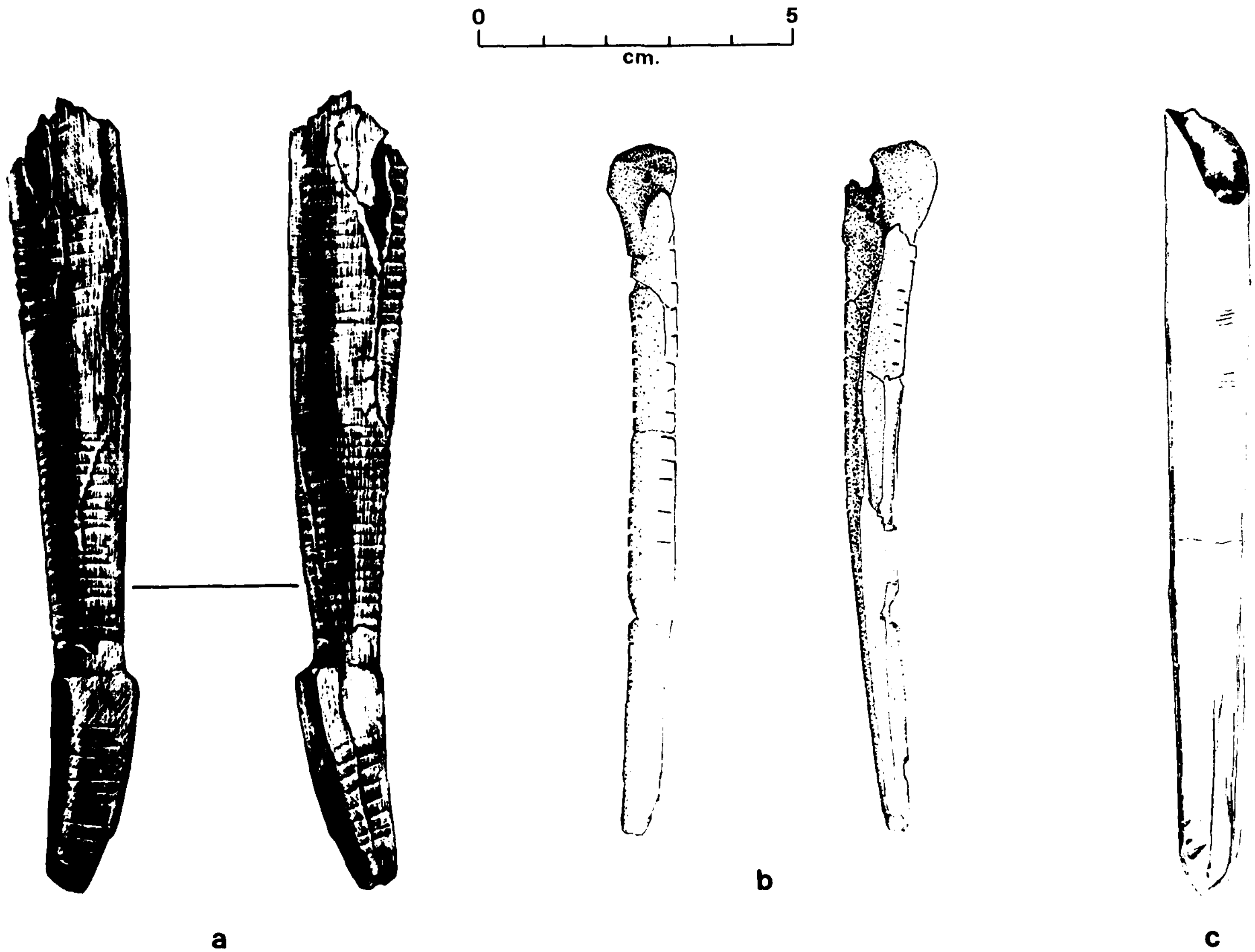


Figure 3-19. Bone artifacts, 45-DO-285; a. 14N32W/160/M#643 and 644/Zone 4; b. 14N33W/110/Zone 3/M#733; c. 15 N27W/60/Zone 1/M#319.

tool fragments and indeterminate bone artifacts are from Zone 1. Ochre drops sharply in frequency below Zone 1.

STYLISTIC ANALYSIS

The purpose of the stylistic analysis of projectile points is to identify morphological characteristics which are sensitive to temporal and spatial cultural variation. By correlating sensitive stylistic types with radiocarbon dates, we can develop a local chronology and sequence of human occupations which can be compared with sequences developed in other regions of the Plateau.

We have developed a two-stage analysis for projectile points. The first stage involves the identification of morphological types within the project area alone. These types have then been ordered into a temporal sequence on the basis of their occurrence in project sites. We have had to rely on outside sources for approximate time spans for a few types which do not appear in firmly dated contexts. These exceptions will be noted in the discussion which follows.

The second stage involves the statistical redefinition of the morphological types in terms of established Plateau historical forms. We may then evaluate the two systems of classification. The comparison also allows us to correlate our results with those of other Plateau archaeological studies and to focus on trends that may represent cultural differences.

This system of analysis has evolved over the past two years as data from individual site analysis has become available. The entire process and project-wide results will be reported and evaluated in the summary report (Lohse 1984g). Projectile points are illustrated in Plate 3-5 and additional descriptive data is found in Appendix B.

Eleven dimensions of analysis were established for the identification of morphological types. Intersection of the first four dimensions, that is blade-stem juncture, outline, stem-edge orientation and size, defines 18 separate types (Figure 3-20). Intersection of the additional seven dimensions--basal edge shape, blade edge shape, cross section, serration, edge grinding, basal edge thinning and flake scar patterning--allows detailed description and identification of variants within the type categories, but creates a breakdown of the data which emphasizes variation (Appendix B).

Thirteen of the 18 morphological projectile point types occur in the collection from 45-DO-285 (Table 3-21). We do not consider Type 1, the large triangular form, a finished projectile point. It lacks basal modification which would allow it to be hafted. We think Type 1 is more adequately described as a knife although we would need to functionally analyze an adequate sample of such artifacts in more detail to verify this judgment. We also cannot rule out the possibility that the artifact represents the preform stage in the bifacial reduction sequence and awaited only final notching for completion. We consider the Type 2 (Plate 3-5;a,b) to represent the preform stage discussed earlier in the bifacial reduction sequence (Figure 3-1). These artifacts are similar in size and care of manufacture to the small

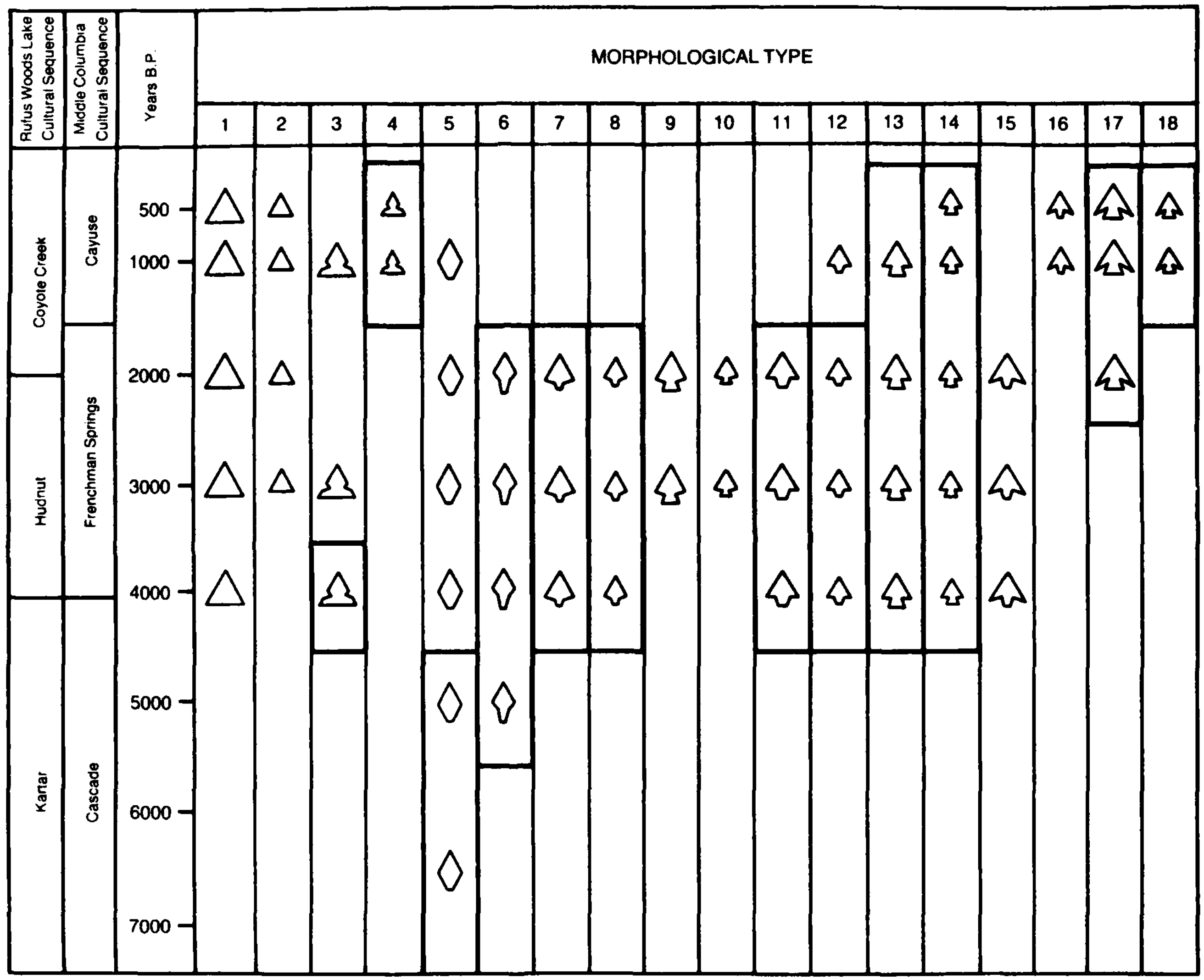


Figure 3-20. Current distribution of morphological projectile point types in the Chief Joseph Dam Project area, subject to change with addition of information from newly zoned sites.

KEY
Master Number:
Morphological Type:
Historical Type:
Provenience/Level:
Zone:
Material:

a.	b.	c.	d.	e.	f.
571	850	677	312	862	1216
Type 2	Type 2	Type 4	Type 4	Type 4	Type 4
Not Assigned	Not Assigned	Cold Springs Side-notched	Plateau Side-Notched	Plateau Side-Notched	Plateau Side-Notched
10N32W/90	12N31W/70	17N27W/60	15N28W/70	11N31W/40	15N31W/20
2	1	1	1	1	1
Argillite	CCS	CCS	CCS	CCS	CCS

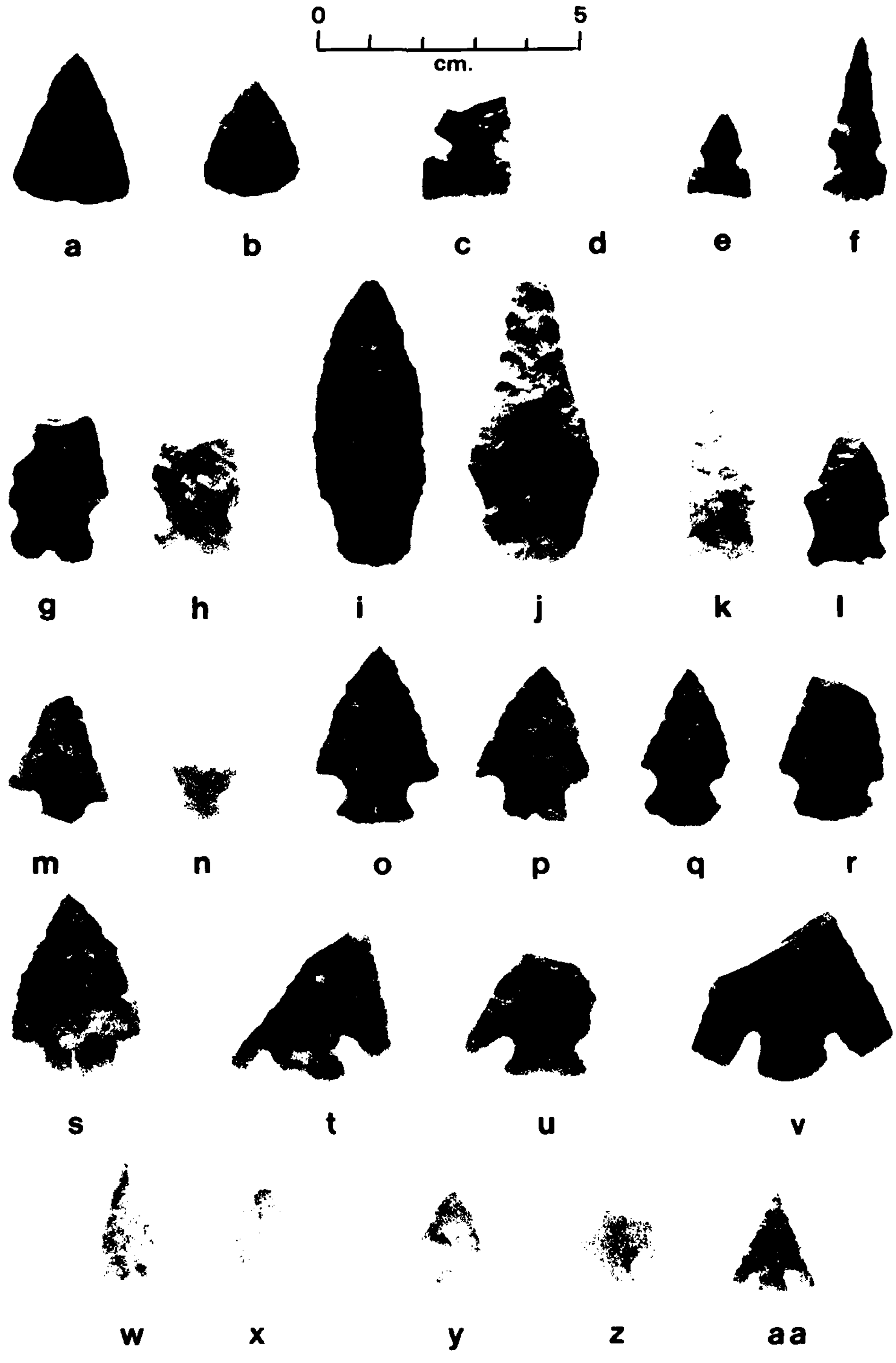
g.	h.	i.	j.	k.	l.
218	1047	911	817	699	432
Type 3	Type 3	Type 6	Type 6	Type 9	Type 9
Cold Springs Side-notched	Cold Springs Side-notched	Shouldered Lanceolate	Shouldered Lanceolate	Cold Springs Side-notched	Cold Springs Side-notched
12N33W/110	14N31W/120	11N32W/30	11N/32W/150	14N33W/100	17N32W/120
2	3	1	4	3	3
CCS	CCS	CCS	CCS	CCS	CCS

m.	n.	o.	p.	q.	r.
635	1176	632	770	693	1187
Type 11	Type 10	Type 13	Type 13	Type 13	Type 13
Rabbit Island Stemmed A	Rabbit Island Stemmed A	Quilomene Bar Corner-notched	Quilomene Bar Corner-notched	Columbia Corner-notched	Columbia Corner-notched
9N32W/170	16N31W/130	9N31W/30	14N33W/100	14N33W/80	15N31W/110
3	3	1	3	2	3
CCS	CCS	CCS	CCS	CCS	CCS

s.	t.	u.	v.
40	1243	1066	1033
Type 17	Type 17	Type 17	Type 17
Quilomene Bar Corner-notched	Quilomene Bar Basal-notched A	Quilomene Bar Basal-notched B	Quilomene Bar Basal-notched A
15N34W/100A	15N32W/160	13N31W/100	11N30W/170
3	4	3	4
CCS	Argillite	CCS	Argillite

w.	x.	y.	z.	aa.
376	1114	1196	602	309
Type 14	Type 14	Type 18	Type 18	Type 18
Columbia Corner-Notched B	Columbia Corner-Notched A	Columbia Stemmed C	Columbia Corner Notched B	Columbia Stemmed A
16N30W/50	13N32W/120	16N32W/50	9N31W/70	15N28W/50
1	3	1	2	1
CCS	CCS	CCS	CCS	CCS

Plate 3-5. Projectile points, 45-DO-285.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projectile point types. They also have a similar temporal distribution (Figure 3-20).

Table 3-21. Correlation of radiocarbon dates, morphological projectile point types and estimated zone ages, 45-DO-285.

Zone	Radiocarbon[1] Date	Estimated Age B.P	Morphological Type													Total
			1	2	6	13	17	3	9	10	11	14	18	12	4	
1	299±90 350±80	450		2	1	2	2					1	4	1	11	24
2		2000		1		3							1			5
3	1680±950	2500	1			4	3	2	2	1	1	1				15
4		3000			1	1	3									5
TOTAL			1	3	2	10	8	2	2	1	1	2	5	1	11	49

[1] Refer to Appendix A.

The remaining projectile point types are distributed among the zones as shown in Table 3-21. Because we lack radiocarbon dates for Zone 2 and 4 and the date for Zone 3 has such a large standard deviation, the projectile point types provide us with the only means of estimating the age of the occupation of these zones.

Correlating the time spans represented by the types with their distribution among the zones and the available radiocarbon dates allows us to reach the following age estimates. Zone 4 is represented by Types 6, 13 and 17. The lower limit for this zone's occupation is a compromise date between the appearance of the older Type 6 and Type 13 forms and the younger Type 17. All of the types continue to appear in the zones above.

The Zone 3 projectile points mark the appearance of Types 3, 9, 10 and 11. Types 9 and 10, which appear in the project area about 3,000 years ago, and the increased number of Type 17 provide the lower age estimate for this zone. Types 3 and 10 appear after 4500 B.P. which overlaps the previous Zone 4 estimate. The upper age is provided by Types 9 and 10 which no longer appear after 2000 B.P. The time span estimated for the zone from 2500 to 2000 B.P. approximates the lower limit of a single standard deviation of the radiocarbon date of 1680±950 B.P. It does not, however, accomodate the upper limit.

Zone 2 relies on Types 9, 10 and 18 to establish a lower age estimate. Types 9 and 10 no longer appear after 2000 B.P. and Type 18 makes its appearance slightly later. We are forced to rely on the very limited evidence of two projectile points and the ages of the bracketing zones to date Zone 2 and to estimate the time span represented.

The estimated ages of these three zones should be regarded as tenuous. All rely to some extent on morphological types (3, 9, 10, 17) which are poorly documented in the project area. Types 3 and 17, in particular, have temporal spans based on comparison to similar forms elsewhere in the Plateau.

Zone 1 provides us with the firmest evidence of age. The radiocarbon dates and the projectile point styles suggest occupation from 450 B.P. to the protohistoric. The absence of European trade goods from this zone supports the upper age limit.

In the second stage of the analysis, the morphological classification was compared by discriminant analysis to a type collection of 700 specimens. This collection includes 22 historic types based on artifacts from well dated contexts at sites from the Fraser River to the Snake and from the Dalles to the Libby Reservoir in Montana (Appendix B). Many of the locations are type sites for the projectile points. The comparison was made on the basis of the digitized measurements presented in Appendix B.

Table 3-22 presents the relation of morphological types to historic types. We find this process generally makes more distinctions in the categories with larger populations. For example, Type 17 is reclassified into four historical types. This is not necessarily the case among all the sites' projectile point assemblages. The reverse is often true (cf., 45-DO-214, 45-OK-287/288) and at 45-OK-285, five of the historical categories include at least two morphological types.

Table 3-23 presents the distribution of the historical types by zone. Figures 3-21 and 3-22 present a preliminary distribution of historical types in the project area among the Rufus Woods Lake cultural phases. Although representative of broad time spans, we find no immediate reason to re-evaluate our proposed age estimates. The prominent historical types in Zones 3 and 4, the Quilomene Bar, and Columbia Corner-notched A forms show phase associations amenable to the age estimates.

Zone 3 contained two indented base side-notched points exhibiting several characteristics of Cold Springs side-notched points. Because the landmark digitizing system did not identify the indented bases (Appendix B, Figure B-4), the points were classified as Cold Springs side-notched, the closest morphological analog, implying a pre 4000 B.P. age (Nelson 1969 and Bense 1972). We then sought comparison to other types in the regional literature.

Similar basal modification is illustrated by Nelson (1969: Figure 38) for a projectile point from a Cayuse Phase association. On the Lower Snake River, a similar form has been found to be the dominant style in the Alpowai Tucannon Phase (2000-4000 B.P) assemblage (Brauner 1976:Type 01-12A). On the Clearwater River, the Hatwai eared style, similar to the Alpowai projectile points, has been dated from 3100 to 5050 B.P. (Ames et al. 1981:Figure 6;j,f). These projectile points are generally rare in other Tucannon Phase components except at Granite Point (Kennedy 1976). Our estimate for the age of Zone 3 accomodates the Tucannon Phase but not the Hatwai sequence.

Table 3-22. Morphological type by historical type, 45-DO-285.

Historic Type	Morphological Type and Code													Total
	1	2	6	13	17	3	9	10	11	18	12	14	4	
	N1N1	N1N2	22NN	3131	4131	1NN1	2131	2112	3121	4132	3122	3132	1NN2	
Shouldered Lanceolate			2											2
Cold Springs Side-notched						2	2							4
Rabbit Island Stemmed A								1	1					2
Rabbit Island Stemmed B											1			1
Quilomene Bar Basal-notched A					2									2
Quilomene Bar Basal-notched B					1									1
Quilomene Bar Corner-notched				4	3									7
Columbia Corner-notched A				5	2							1		8
Columbia Corner-notched B										2		1		3
Wallula Rectangular-stemmed				1										1
Columbia Stemmed A										1				1
Columbia Stemmed C										2				2
Plateau Side-notched													11	11
Not Assigned	1	3												4
TOTAL	1	3	2	10	8	2	2	1	1	5	1	2	11	49

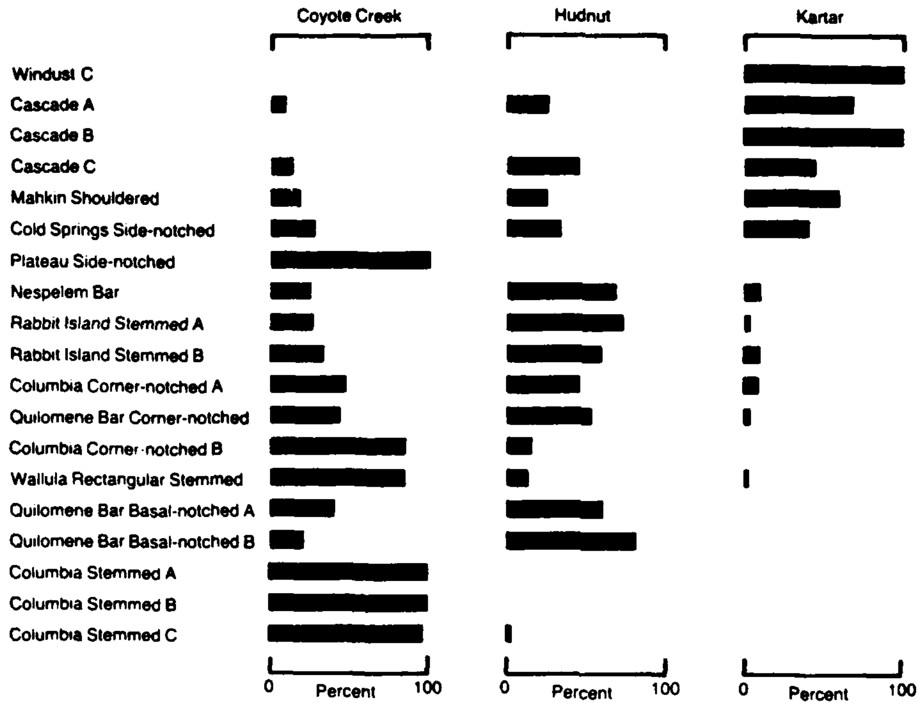

Figure 3-21. Proportions of historic projectile point types across all phases.

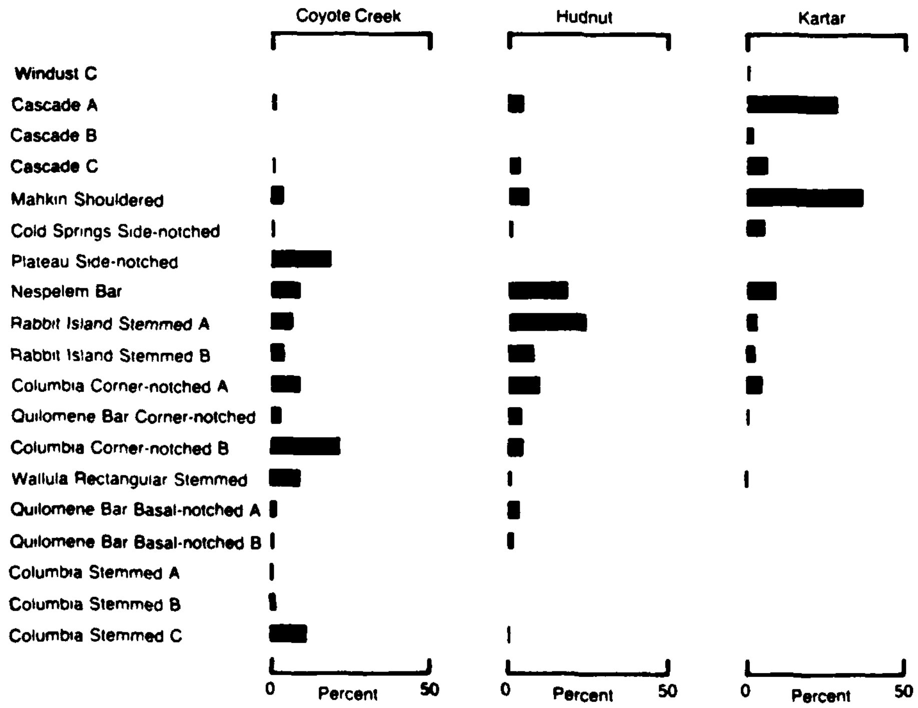

Figure 3-22. Proportions of historic projectile point types within phase.

Table 3-23. Historical types by zone, 45-DO-285.

Historical type	Zone 1	Zone 2	Zone 3	Zone 4	Total
Shouldered lanceolate	1			1	2
Cold Springs Side-notched			4		4
Rabbit Island Stemmed A			2		2
Rabbit Island Stemmed B	1				1
Quilomene Bar Basal-notched A				2	2
Quilomene Bar Basal-notched B			1		1
Quilomene Bar Corner-notched	3		2	2	7
Columbia Corner-notched A	1	2	5		8
Columbia Corner-notched B	2	1			3
Wallula Rectangular-stemmed		1			1
Columbia Stemmed A	1				1
Columbia Stemmed C	2				2
Plateau Side-notched	11				11
Not Assigned	2	1	1		4
TOTAL	24	5	15	5	49

In sum, the most distinctive style in Zones 3 and 4 remains the Quilomene Bar Basal-notched. In Zone 3, the corner-notched forms dominate the collection and as noted above, the two indented base side-notched forms from the zone may be dated to roughly the same time period. We suggest the assemblages of Zones 3 and 4 represent Late Hudnut occupations (Figure 3-23). The succeeding Zones 1 and 2, with a variety of small stemmed, side- and corner-notched forms, are associated with the Coyote Creek Phase. The Zone 2 projectile points, depositional environment, and small assemblages present us with little data to restrict age beyond the proposed 2000 to 450 B.P. span. The two radiocarbon dates and the high frequency of Plateau side-notched points (morphological Type 4) allow us comfortably to date Zone 1 from 450 B.P. to the protohistoric.

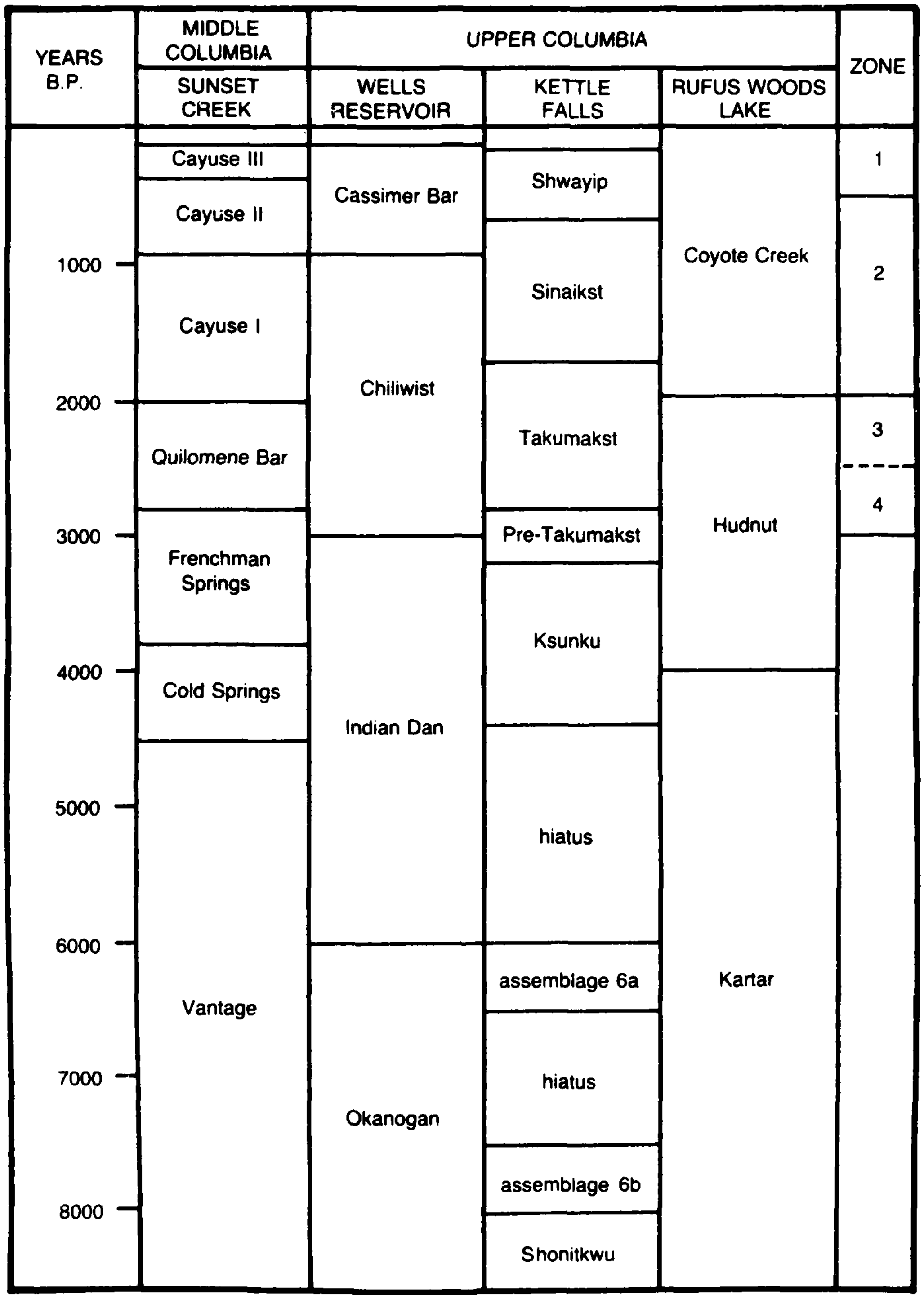

Figure 3-23. Cultural zones at 45-DO-285 in relationship to Rufus Woods Lake cultural phases and cultural sequences of nearby study areas adapted from Nelson 1969, Grabert 1968, Chance and Chance 1977, 1979, 1982.

4. FAUNAL ANALYSIS

Zoological remains from archaeological sites provide a unique source of data on the ecology and historic biogeography of animal species living in the site area, and on utilization of faunal resources by human occupants. This chapter describes the faunal assemblage recovered from 45-DO-285, and summarizes the implications of the assemblage for understanding the archaeology of the site.

FAUNAL ASSEMBLAGE

The faunal assemblage consists of 24,293 bone fragments weighing 9,156 g. Owing to the highly fragmented nature of the sample, only 901 (approximately 4%) of the sample, are identifiable. Of the 901 identified elements, 616 (68%) are mammalian, 23 (2%) are reptilian, 167 (19%) are amphibian, and 95 (11%) are fish. Three shell fragments weighing 35 g were recovered. Shell materials have not yet been analyzed. The distribution of faunal materials among zones is shown in Table 2-2. Taxonomic composition and distribution of vertebrate remains for the site as a whole and by zone are presented in Table 4-1. The following summary presents the elements identified for each taxon, criteria used to identify them where applicable, and some remarks concerning past and present distribution and cultural significance. A summary of the elements representing each taxon is provided in Appendix A.

SPECIES LIST

MAMMALS (NISP=613)

Sorex spp. (shrew)-- 2 elements.

Five species of shrews are known to occur in the project area: *Sorex obscurus*, *S. vagrans*, *S. cinereus*, *S. trowbridgii*, *S. merriami*. These elements could not be identified to the species level.

Lepus cf. *townsendii* (hare)-- 1 element.

Two species of *Lepus* currently inhabit the project area. *L. townsendii* (white-tailed hare) and *L. californicus* (black-tailed hare). A third species, *L. americanus* (snowshoe hare), inhabits regions adjacent to the project area. These elements could not be assigned to species on the basis of morphological features. *L. californicus* is thought to have

AD-A164 554 ARCHAEOLOGICAL INVESTIGATIONS AT SITE 45-DO-285 CHIEF JOSEPH DAM PROJECT WASHINGTON(U) WASHINGTON UNIV SEATTLE OFFICE OF PUBLIC ARCHAEOLOGY C J MISS ET AL. 2/2

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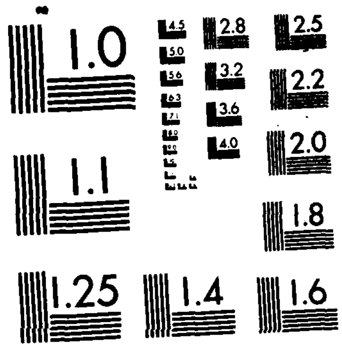


MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

Table 4-1. Taxonomic composition and distribution of vertebrate remains from 45-DO-285.

Taxa	Zone 1		Zone 2		Zone 3		Zone 4		Site Total	
	NISP	MNI	NISP	MNI	NISP	MNI	NISP	MNI	NISP[1]	MNI[2]
MAMMALIA (NISP=613)										
Soricidae										
Sorex spp.					2	1			2	1
Leporidae										
Lepus cf. *townsendii*					1	1			1	1
Sciuridae										
Spermophilus spp.	1	1	1	1	1	1			3	1
Marmota flaviventris	6	1	1	1	15	2	31	2	53	3
Geomyidae										
Thomomys talpoides	35	5	40	7	64	5	84	7	223	16
Heteromyidae										
Perognathus parvus	43	10	15	5	18	5	2	2	78	19
Cricetidae	20	-	15	-	12	-	15	-	62	-
Peromyscus maniculatus	4	2	1	1	1	1			6	3
Microtus spp.	3	2	2	2	1	1	2	2	8	3
Lagurus curtatus	12	7	15	4	3	2	8	2	38	13
Canidae										
Canis spp.			1	1	1	1	2	1	4	1
Mustelidae										
Taxidea taxus					1	1			1	1
Cervidae	4	-			1	-	1	-	6	-
Cervus elaphus	1	1	1	1	9	1	6	1	17	1
Odocoileus spp.	7	1	3	1	13	1	7	1	30	1
Bovidae										
Bison sp.					7	1	5	1	12	1
Ovis canadensis	3	1	1	1	8	1	3	1	15	1
Deer-Sized	7	-	2	-	14	-	14	-	37	-
Elk-Sized	1	-			9	-	9	-	19	-
REPTILIA (NISP=23)										
Chelydridae										
Chrysemys picta	10	1	4	1	6	1	3	1	23	1
AMPHIBIA (NISP=167)										
Ranidae/Bufonidae	4	1	2	1	114	9	47	4	167	13
PISCES (NISP=95)										
Salmonidae	6	-							6	-
Oncorhynchus tshawytscha	61		11		9		5		86	
Cyprinidae	2	1							2	1
Catastomidae	1	1							1	1
TOTAL	232		115		310		244		901	

[1] Number of Identified Specimens.
[2] Minimum Number of Individuals.

immigrated from the Great Basin during the early part of the twentieth century (Couch 1927; Dalquest 1948). L. americanus is largely nocturnal and secretive, it inhabits wooded areas. Consequently, this specimen has been assigned to L. cf. townsendii.

Marmota flaviventris (yellow-bellied marmot) -- 53 elements.

All marmot remains have been tentatively assigned to the species M. flaviventris on the basis of present distribution. This species is the only marmot now living in the project area, and is a common resident of talus slopes. Ethnographies report that marmots were exploited as a small game resource by inhabitants of eastern Washington (Ray 1932; Post, in Spier 1938). Their presence in this faunal assemblage may indicate prehistoric exploitation.

Spermophilus spp. (ground squirrel)-- 3 elements.

Three species of ground squirrels are currently found in eastern Washington: Spermophilus columbianus, S. washingtoni, and S. townsendii. S. columbianus is larger than the other two and prefers more mesic habitats. S. washingtoni and S. townsendii are smaller and prefer sagebrush and grass zones to the south and east of the project area (Dalquest 1948:268; Ingles 1965:169). These elements could not be assigned to species. Ground squirrels have been reported as a food resource in the ethnographic literature (Ray 1932:82).

Thomomys talpoides (northern pocket gopher) -- 223 elements.

Thomomys talpoides is the only geomyid rodent in the project area. Because pocket gophers are extremely fossorial and there is no evidence that they were utilized either prehistorically or more recently, their presence in this assemblage may be considered the result of natural processes.

Perognathus parvus (Great Basin pocket mouse) -- 78 elements.

Perognathus parvus is the only heteromyid rodent known in the project area. Like the pocket gophers, P. parvus is most likely present as a result of natural agents of deposition.

Peromyscus maniculatus (deer mouse) -- 6 elements.

Peromyscus maniculatus is a resident of all habitat types in the project area. There is no evidence that deer mice were ever utilized.

Microtus spp. (meadow mouse) -- 8 elements.

Three species of Microtus occur in the site area: M. montanus, M. pennsylvanicus and M. longicaudus. All three species inhabit marshy areas or live near streams. M. montanus can also be found in more xeric areas. None of the elements recovered could be assigned to species. There is no evidence that this genus is present because of cultural processes.

Lagurus curtatus (sagebrush vole) -- 38 elements.

The sagebrush vole generally inhabits dry sagebrush habitat which is sparsely grassed (Maser and Storm 1970:142). Only cranial material of this genus is readily distinguished from Microtus on osteological bases (Grayson 1981). L. curtatus is probably present in this assemblage as a result of natural processes.

Canis spp. (dog, coyote, wolf)-- 4 elements.

Both Canis latrans (coyote) and C. familiaris (domestic dog) are common in the project area today. C. latrans is an indigenous species, and C. familiaris has great antiquity in the Northwest (Lawrence 1968). C. lupus (wolf) also is known to have been a local resident in the past, but has been locally extinct since about 1920 (Ingles 1965). It was not possible to determine the species of these elements. Ethnographically dogs were used for hunting deer, but were not eaten except in emergencies (Post, in Spier 1938). Coyotes, however, were considered good food (Ray 1932:90).

Taxidea taxus (badger) -- 1 element.

The badger is a powerful burrower and is found thoughout eastern Washington, although not in large numbers (Ingles 1965). Badgers were trapped regularly by the Sanpoil and Nespelem (Ray 1932:85). This specimen may be present due to cultural processes.

Cervus elaphus (elk) -- 17 elements.

Elk are rare in the extant local fauna. The closest population is in the Cascade Mountains to the west (Ingles 1965). Elk bones occur in low frequencies in many archaeological sites in eastern Washington, however, indicating that elk once ranged much more extensively than at present and/or that people were traveling great distances to hunt them.

Odocoileus spp. (deer)-- 30 elements.

Two species of deer may be represented in this assemblage, Odocoileus hemionus and O. virginianus. Deer are thought to have represented a major food resource to the prehistoric inhabitants of eastern Washington

(Gustafson 1972), as they were for recent peoples described in ethnographic studies of the region (Post, in Spier 1938; Ray 1932).

Bison bison (bison)-- 12 elements.

Bison are known from project area assemblages dated between A.D. 500 and A.D. 1500. They have been reported in ethnographies but never were observed in this area by European settlers (Schroedl 1973). The close skeletal similarity between Bos and Bison makes it difficult to distinguish between them (Olsen 1960). These specimens, however, were identified on the basis of the depth of the deposits from which they were recovered.

Ovis canadensis (mountain sheep) -- 15 elements.

Mountain sheep occur in archaeological sites in eastern Washington with some regularity. The presence of this species is somewhat difficult to interpret, however, because references to it in the ethnographic literature are scarce. Morever, when competition with man and domestic stock for range became severe during historic times, the habitat preference of this species appears to have changed (Manville, in Monson and Sumner 1980). Ethnographies report that mountain sheep are known to have been exploited both for meat and as a source of bone for tools (Spinden 1908).

Deer-sized (deer, sheep, antelope) -- 37 elements.

Elk-sized (elk, cow, bison) -- 19 elements.

REPTILIA (NISP=23)

Chrysemys picta (painted turtle) -- 23 elements.

Painted turtle is the only turtle currently living in the project area. Clemmys marmorata (western pond turtle) has been reported in the eastern part of Washington in the ethnographic literature, but there is no way to ascertain if taxonomic identification is accurate. C. marmorata now occur only on the west side of the Cascades and in the southern part of the state. On the basis of present distribution, all turtle remains have been assigned to C. picta. The turtle shell in this assemblage is too fragmentary to determine whether it is carapace or plastron.

AMPHIBIA (NISP=167)

Ranidae/Bufonidae (frogs, toads) -- 167 elements.

Both frogs and toads inhabit the project area (Stebbins 1966). Inadequate comparative material precluded assigning these elements to family.

PISCES (NISP=95)

Salmonidae (salmon, trout, whitefish) -- 6 elements.

These vertebrae could belong to any one of at least eight species of salmonid fish known in the project area. All fish vertebrae with parallel-sided fenestrated centra were assigned to this family.

Oncorhynchus tshawytscha (Chinook salmon) -- 86 elements.

Chinook salmon is the largest of the five species of salmon that formerly spent part of their life cycle in the project area. The only salmonid elements that could be identified to species level are the otoliths.

Cyprinidae (carp and minnows) -- 2 elements.

Catostomidae (suckers) -- 1 element.

Inadequate comparative collections precluded more specific identification of fish vertebrae. Assignment of nonsalmonid fish vertebrae to family was made on the basis of size. At least seven species of cyprinid fish occur in the project area. One ethnography reports that groups exploited them (Post, in Spier 1938). These fish remains are probably present as a result of human activity.

DISCUSSION

The faunal assemblage includes taxa that were deposited by both cultural and natural agents. The cutting of skin and meat from bone may result in striae, and the deliberate breakage of bone in flaking: such marks are used here as evidence of cultural agents of deposition. This bone assemblage includes seven fragments that show evidence of wear or manufacture beyond that expected from butchering activities. These specimens have been discussed in Chapter 3. The remaining identified assemblage includes only four elements bearing evidence of butchering: two deer-sized tibia fragments in Zone 1 and in Zone 3 have flake marks, and one *Cervus elaphus* mandible in Zone 4 has striae on the ascending ramus. Burned bone occurs in low frequencies in all zones. Additional burned fragments and fragments exhibiting butchering marks occur in the unidentifiable fraction of this assemblage. The taxa with elements bearing evidence of butchering or burning include deer, elk, turtle and ground squirrels (Table 4-2). This, of course, represents a minimal list

of utilized taxa; others could have been utilized in a manner that would leave no evidence of butchering or burning. Poor preservation could also mask evidence of use. Other indicators of cultural use, such as ethnographic records, have been noted in the preceding discussions of each taxon.

Table 4-2. Burning and butchering marks[1] on the faunal elements, 45-DO-285.

Taxon	Zone 1			Zone 2		Zone 3			Zone 4		
	Burned	Butchered		Burned	Butchered	Burned	Butchered		Burned	Butchered	
		2	5				2	5		1	5
<u>Spermophilus</u> spp.											
Femur	1										
Cervid											
Antler	3		3			1		1			1
<u>Cervus elaphus</u>											
Mandible										1	
<u>Odocoileus</u> spp.											
Molar fragment				1							
Deer-Sized											
Tibia		2					1				
Metacarpal								1			
Metatarsal								1			
<u>Chrysemys picta</u>											
Shell	1			4		2			1		

[1]Code of butchering marks: 1 = striae; 2 = flake scar; 5 = artifact

The assemblage has a large number of highly fragmented artiodactyl elements. Undoubtedly much of the unidentifiable fraction of this assemblage represents more of the same individuals. The fragmented nature of the artiodactyl elements is suggestive of deliberate breakage of the bones for marrow extraction (Leechman 1951) or manufacture of bone implements. The regular occurrence of Sciurids (<u>Spermophilus</u> spp. and <u>Marmota flaviventris</u>) may represent an additional resource. Likewise the large number of turtle and fish elements may indicate a broad exploitation of available taxa.

The high incidence of Chinook salmon (<u>Oncorhynchus tschawytscha</u>) otoliths in this assemblage may indicate that nearby fall spawning grounds were being exploited, or they may also indicate interception of spring/summer runs on their way to upper drainage. Chinook salmon migrate upstream from the Pacific Ocean in late May and early June, and again in August and September. They spawn from July to September (Wydoski and Whitney 1979:59).

In addition to the anadromous fish (<u>Oncorhynchus tschawytscha</u>) discussed above, two other seasonally active taxa are represented in this assemblage: marmots (<u>Marmota flaviventris</u>) and painted turtles (<u>Chrysemys picta</u>). Marmots enter estivation as early as June and go into hibernation in August or September. They emerge in March (Ingles 1965; Dalquest 1948). The occurrence

of *M. flaviventris* in cultural deposits may indicate the site was occupied during some or all of the months from March through June. Painted turtles hibernate from late October until March or April (Stebbins 1966; Ernst and Barbour 1972). The occurrence of either of these species in cultural deposits may indicate that the site was occupied during some or all of the months from March through October, a seasonal span that overlaps the spawning season of Chinook salmon.

SUMMARY

The vertebrate fauna from 45-DO-285 is representative of the fauna expected in the project area (Lyman, in Leeds et al. 1981). With the exception of mountain sheep (*Ovis canadensis*) and bison (*Bison bison*), all taxa represented currently live in or near the project area. Most of the assemblage is in highly fragmented condition, indicating intensive use and/or poor preservation of the larger taxa.

A number of smaller vertebrates that may have provided supplemental resources are represented, but there is evidence only for the use of *Spermophilus* spp., *Chrysemys picta* and the fish. Other small vertebrates, especially the gophers (*Thomomys talpoides*) and mice (*Perognathus parvus*, *Peromyscus maniculatus*, *Lagurus curtatus*, *Microtus* spp.), most likely occur in this assemblage because they are intrusive site residents.

5. SYNTHESIS

This chapter summarizes and integrates the information detailed in the previous chapters. The following sections describe geological, chronological, faunal and seasonality data and the horizontal distribution of artifacts and features associated with each zone. The final section discusses the site and its relation to the project area and the Plateau archaeological record.

GEOCHRONOLOGY

Buckley Bar now is an island in Rufus Woods Lake. The bar formed as the Columbia River migrated, cutting its way through glacial deposited valley fill. As it cut down, it left point bars along its shore. Subsequent deposition at Buckley Bar is related almost entirely to fluvial processes.

Zone 4 is associated with the earliest basal gravels and bedded sands (DU I and II) and earliest overbank deposits (DU III). The presence of overbank deposits in this and subsequent zones on the western side of the island suggests that the bar was detached from the mainland prior to or shortly after the deposition of the earliest DU III sediments. Before the filling of Rufus Woods Lake, the western channel was shallow and Buckley Bar cut off from the mainland only during periods of high water. The northern part of the channel was affected by a drainage which cut northward along the western bar shore adjacent to 45-DO-285. Thus, except for periods of high flow, the problems of access to the island would not have been extreme. Our only indications of age for the deposits of this zone are provided by the artifact assemblage which suggest use began about 3,000 years ago.

Zones 3 and 2 are enclosed in wind modified fluvial deposits (DU III). A single radiocarbon date with a large standard deviation, projectile point styles, and the age of Zone 1 suggest dates for these sediments from 2500 to 450 B.P.

Zone 1 matrix includes wind modified overbank deposits and recent flood and aeolian deposits (DU III and IV). The matrix represents deposition over the last 500 years as dated by two radiocarbon age determinations and projectile point styles. Historic material is confined primarily to the uppermost, recent depositional unit.

CULTURAL CHRONOLOGY

It is difficult for us to determine the age of the earliest deposits and occupations at 45-DO-285. We lack sufficient radiocarbon dates and, while the sequence of stylistic changes of the projectile points is clear, several types are not well represented. Additionally, we are forced to rely on some

morphological projectile point styles which lack firmly dated contexts in the project area as a whole.

To make an age estimate for Zone 4, we must rely on five projectile points. Of the five, the three Type 17 points have the youngest estimated age of 2500 B.P. The remaining points provide little additional data beyond suggesting a somewhat earlier date. The Type 13 point appears as early as 4500 B.P. in the project area. The single Type 6 (Plate 3-5; j) is somewhat aberrant in form suggesting it has been remodified or had another intended use. We thus tentatively suggest an initial date of 3000 B.P. for this zone to distinguish it chronologically from the succeeding zones. We believe that there are enough contrasts between the assemblages of Zones 3 and 4, particularly in material types, to warrant this separation.

Zone 3 yielded a single radiocarbon date of 1680±950 B.P. This date, the occurence of the Type 9 and 10 projectile points, and the increased number of Type 17 projectile points, allow us to estimate the time span represented by Zone 3 as 2500 to 2000 B.P. We are confident of the lower limit of the estimates, but less so of the upper limit. This upper determination is based on the chronological span of Types 9, 10 and 11 and does not accomodate a single standard deviation of the radiocarbon date. Types 9 and 10 and the indented base form of Type 3 are not as reliably dated in the project area as are other forms. (See discussion of this in Chapter 3.)

Zone 2 is tentatively dated on the basis of only five projectile points. The appearance of Type 18 in this zone and the absence of Types 9, 10 and 11 provide the lower age estimate of 2000 B.P.

Reliable radiocarbon dates are available for Zone 1. The dates indicate site use after 500 B.P. The upper limit is placed at about 1700 A.D. because of the lack of Euroamerican trade goods which would indicate historic use of the site.

The age estimates for the analytic zones at 45-DO-285 overlap archaeological phases defined for the Middle and Upper Columbia (Figure 3-21). Comparing the projectile points from Zones 3 and 4 to the Sunset Creek sequence (Nelson 1969), the most detailed of the three available groups of data, we find interesting comparisons and contrasts. By simply equating time periods we find the zones include all or portions of the Frenchman Springs, Quilomene Bar and Cayuse Phases. When we compare the projectile points from Zone 4 to those defined for Sunset Creek, we find types similar to the shouldered lanceolate (Type 6), and Quilomene Bar Basal-notched (Types 13 and 17). In Zone 3, the predominant styles are Quilomene Bar Basal and corner-notched forms and the Columbia Corner-notched A. In addition, the comparison to historical types identified large side-notched points (Types 3 and 9) in some ways similar to Cold Springs Side-notched points. Two of these specimens have indented bases and are similar to Tucannon Phase projectile points of the Southern Columbia Plateau (2000-4000 B.P.). Stemmed forms typical of the Hudnut Phase are notably absent as are other earlier styles.

We find the Quilomene Bar Phase association for Zone 4 an acceptable one. However, recalling the difficulty in arriving at age estimates for this zone, the possibility of an earlier occupation, and the general lack of definition of the Quilomene Bar Phase as a significant cultural chronological unit (Galm

et al. 1981), we suggest regarding Zones 3 and 4 as assemblages comparable in style and content to pre-Cayuse occupations on the Middle Columbia. We find the assemblages of Zones 1 and 2 to be similar to the Cayuse Phase material. This suggestion corresponds well with the recently proposed Rufus Woods Lake phase sequence. Zones 3 and 4 are then associated with the Hudnut Phase and Zones 1 and 2 with the subsequent Coyote Creek Phase.

SEASONALITY

Few indicators of seasonality were recovered from 45-DO-285. They are limited to a small number of faunal remains recovered from each zone (Figures 4-1 and 5-1). The reliability of seasonal interpretation depends upon the degree to which the fauna may be associated with a specific zone. The higher numbers of marmot remains in Zones 3 and 4 for example more likely represent primary deposition than the lower numbers of Zones 1 and 2.

In general, the fauna indicate a broad range of site use from late spring to early fall. Refinement of estimates within the zones is somewhat limited. At least part of the Zone 1 occupation is associated with the Chinook salmon remains. Reconstructing the seasonality of this species prior to Euroamerican contact is difficult given the extermination of the runs by dam construction. Ethnographic accounts are often conflicting as to species identification and seasonal data. In addition, even the earliest accounts deal with a resource that was severely affected by Euroamerican salmon harvesting practices on the Lower Columbia (Craig and Hacker 1940). The estimate presented here is a compromise among the sources cited.

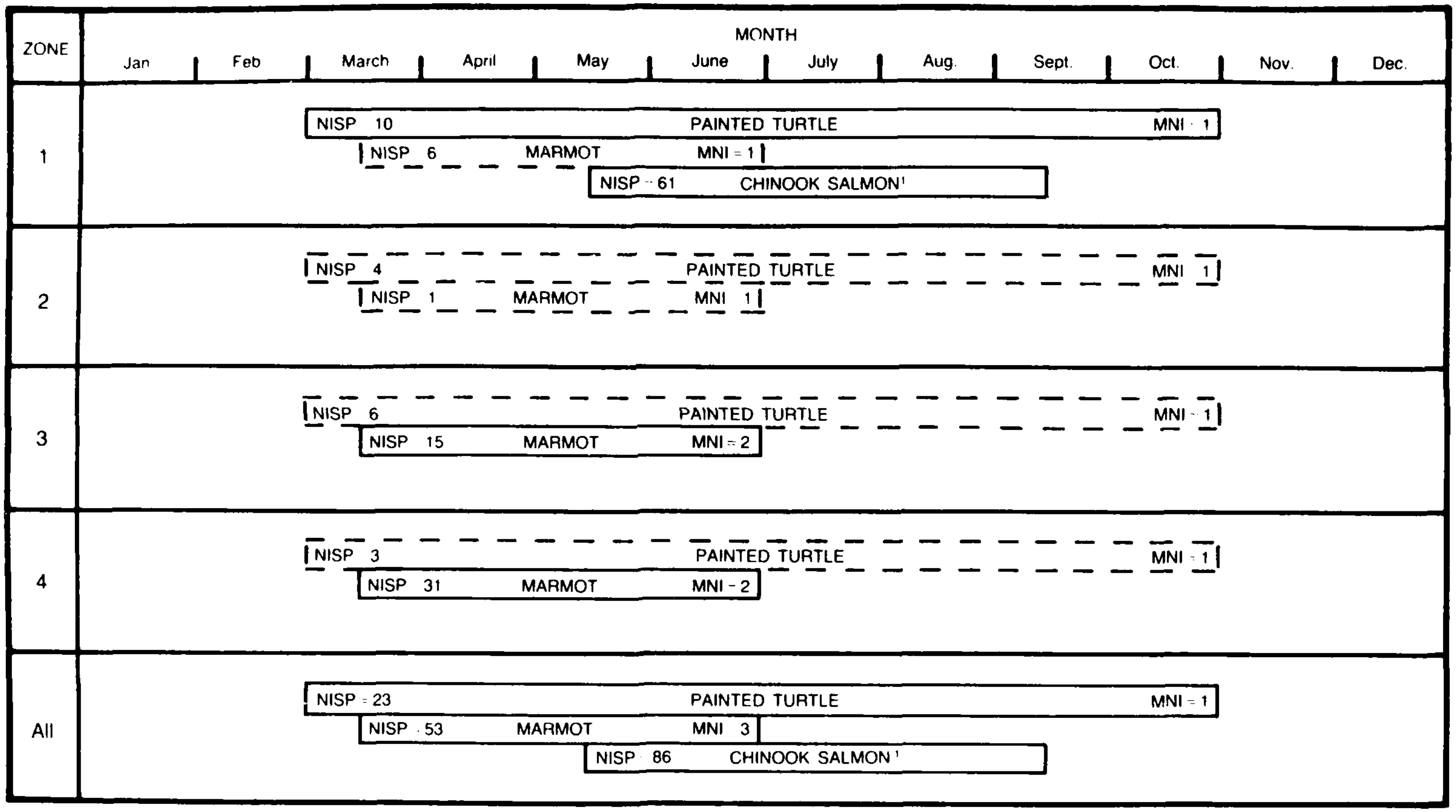
We are dependent in Zones 3 and 4 upon the marmot remains to place site use in the spring. Zone 2 provides material for only the barest estimate of seasonality.

The geographic setting of 45-DO-285 supports the seasonality data. The most reliable data limits the season of site use to late spring. We suggest use of the site would follow seasonal spring run-off when the river had begun to subside and access to the island would have been less difficult.

FAUNA

Faunal material is proportionately second only to lithics in the zonal assemblages (Table 2-2). The taxa include species reported in ethnographies to be important sources of meat and hides. Large mammals include elk, deer, mountain sheep and bison. Of these, only deer are still found in the project area. Smaller mammals are jackrabbit, ground squirrel, marmot, coyote/dog and badger. Non-mammalian species include painted turtle, frog, suckers, minnow/carp and, most significantly, Chinook salmon.

Evidence of cultural modifications, such as burning and butchering, were found on only a few of the identified faunal specimens (Table 4-2). Comparable information was not recorded on the unidentified specimens, but inspection indicates considerable evidence of cultural modification. The highly fragmented nature of the collection suggests processing techniques designed to maximize faunal resources. The number of identifiable individuals (MNI) for



[1] Estimate based on Ray (1932 57) Chance, et al (1977 12), Schalk (1978 70) Wydoski and Whitney (1979 59)

Figure 5-1. Distribution of seasonal indicators by zone, 45-DO-285. Chinook salmon are omitted from Zones 2, 3, and 4 because the sample sizes are so small that primary deposition is questionable.

each species is extremely low in comparison to the total number of bone fragments for each zone. We also find the ratio of identifiable to non-identifiable bone extremely low and fairly consistent among zones with the exception of Zone 2 (Table 5-1). Average weights of the faunal assemblage are less than 0.5 grams per fragment with weights increasing steadily from Zone 1 to Zone 4.

Table 5-1. Ratio of identifable to non-identifable bone and average weight of bone fragments by zone, 45-DO-285.

Zone:	1	2	3	4	Total
Ratio	0.036	0.057	0.038	0.036	0.037
Weight (g)	0.23	0.25	0.42	0.49	0.38

It is difficult for us to determine if there is a cultural explanation for the increasing average weight of the bone fragments. One explanation is the differing emphasis on faunal species among the zones as indicated by frequencies of identified fauna (Table 5-2). We rely again, as in the seasonality discussion, on the largest counts as indication of primary deposition. The lower zones contained the majority of the identified economic fauna, especially the large mammals. Zone 1 yielded many of the same species, but is distinguished primarily by the presence of Chinook salmon.

Table 5-2. Distribution of economic fauna by zone, 45-DO-285.

Fauna	Zone			
	1	2	3	4
Hare	–	–	2.1	–
Ground squirrel	0.9	4.0	1.0	–
Marmot	5.5	4.0	15.6	36.0*
Canis	–	4.0	1.0	2.3
Badger	–	–	1.0	–
Cervid	3.6*	–	1.0	1.2
Elk	0.9	4.0	9.4*	7.0
Deer sp.	6.4	12.0	13.5*	8.1
Bison	–	–	7.3*	5.8
Mountain sheep	2.7	4.0	8.3*	3.5
Deer-sized	6.4	8.0	14.6*	16.3
Elk-sized	0.9	–	9.4	10.5*
Turtle	9.1	16.0*	6.3	3.5
Suckers	0.9	–	–	–
Minnow/Carp	1.8	–	–	–
Salmon sp.	5.5	–	–	–
Chinook salmon	55.5*	44.0	9.4	5.8
N =	110	25	96	86

*Greatest NISP

If the major economic emphasis in Zone 1 was acquisition and processing of fish with hunting and game processing as a secondary activity, we might postulate simply that the processing of more large game results in the production of more large bone pieces.

This argument relies on the presence of the salmon bone in Zone 1 and the geographic setting of the site slightly upstream from Monaghan Rapids. These rapids were located off the northern tip of Buckley Bar. We suspect that this area is a likely focus of fishing activities. However, the depositional environment suggests the trend toward larger bone fragments in the lower zones may be a result of erosion of the smaller. We are not sure this is a good explanation either since numerous small sized artifacts including less than 1/4 in flakes, linear flakes and dentalia shell were recovered from the lower zones.

Why there is little indication of salmon at this locale prior to Zone 1 is somewhat puzzling. It is not because salmon fishing was not an important activity in the overall subsistence system at this time. Salmon bone and fishing gear were recovered from 45-DO-214 just upstream from Buckley Bar (Figure 1-1) in a context dated from 1200 to 1000 B.P. Salmon remains were also recovered from 45-DO-211, still farther upstream, from a pit radiocarbon dated to 3,505±74 B.P. Apparently, salmon were a major resource through much of the occupation of 45-DO-211 dating from 5400 to 2700 B.P. (Lohse 1984b).

The bison remains in Zones 3 and 4 are also of note. Schroedl (1973) was limited in his examination of the archaeological occurence of bison in the Columbia Plateau by the lack of dated contexts from the Upper Columbia River. Based on assemblages and radiocarbon dates from the southern Plateau he postulated three chronologically ordered complexes associated with bison utilization. Only the first and oldest of which concern us here (Schroedl 1973:31). The first complex is associated with an age range from 2500 B.P. to 1500 B.P. With some exceptions--Lind Coulee Site for example (Daugherty 1956)--the dates are few and the cultural assignments of bison bone uncertain prior to 2500 B.P. Schroedl proposes that bison entered the Columbia Plateau only after the environmental effects of the Altithermal had subsided. Even then, there was no startling change in the archaeological record to mark their arrival. Bison were integrated into the existing subsistence pattern without causing remarkable technological innovation or becoming a primary resource. The artifact assemblage associated with this period is characterized by large basal-notched projectile points, corner-notched projectile points, scrapers and triangular and lanceolate knives.

The small number of bison bones from each of the lower zones at 45-DO-285 makes it difficult for us to determine which is the more likely primary context for the single individual identified (Table 4-1). Zone 3 has the greater count and its estimated age accomodates Schroedl's suggestion of about 2500 B.P. for the entry of bison into the region. Zone 4 contains only slightly fewer bison bone. With one exception all bone from both zones is from the same unit (10N32W) from depths ranging from 120 to 170 cm b.u.d. The exception is a single tibia fragment from 290 cm b.u.d. in 20S22W in a Zone 4 depositional context. Assignment of primary context to Zone 4 would slightly increase the age estimate of bison utilization in the Columbia Plateau and raise the possibility of older associations. It appears that bison utilization is evident at least as early as the Hudnut Phase in the project area.

The artifact assemblage associated with Schroedl's first complex is very similar to the Hudnut Phase assemblages of Zones 3 and 4 at 45-DO-285. As stated previously, no marked technological innovation was noted in this complex. However, in addition to projectile point styles, an indication of quantitative differences in certain artifact classes was found. End scrapers and utilized flakes are more abundant in contexts associated with bison (Schroedl 1973:57). In Zone 3 and 4 at 45-DO-285 the projectile points are strikingly similar to those illustrated by Schroedl (1973:Figure 5). In the Hudnut assemblages at 45-DO-285 there are slightly more drills and scrapers. However, other implements associated with hide and bone processing, tabular knives, gravers, choppers, hammerstones, occur with similar frequencies in the Hudnut and Coyote Creek assemblages.

In summary, the faunal evidence shows a relatively broad range of exploitation at the site through time. It also suggests variation in the subsistence emphasis. The earlier Hudnut assemblage seems comparable in functional and stylistic characteristics to a Plateau-wide big game hunting complex including the use of bison. The later Coyote Creek occupations, represented by Zones 1 and 2, retain a strong emphasis on hunting, yet there is evidence that fishing had become important to the site occupants.

ARTIFACT DISTRIBUTION

This section discusses the horizontal spatial patterning of the zone assemblages. We rely on the spatial distribution of artifact class frequencies by unit to define areas of economic interest and to define the extent of site use. Although organization of prehistoric activities is likely to be complex at even the most temporary locations occupied by small groups, the kinds of cultural material recovered allow us to focus on subsistence related activities. Peak frequencies of cultural material, indicating refuse accumulations, lithic manufacture, food processing or hearth areas should occupy a nuclear area within a wider scatter of debris. The patterning of artifact distributions provides possible evidence of how activities were organized within each zone.

Several factors influence the zone distributions and the inferences that can be made from them: the location and number of the sampling units in relation to the size and spatial pattern of the occupations, the rate of artifact discard, duration of occupancy, the number of reoccupations within a zone, the degree to which two or more such occupations overlap, and disturbance of the artifact patterns after deposition. The last factor is of greatest importance. Two principal postoccupation disturbances occur at almost every site in the project area. The first, especially important to the discussion of 45-DO-285, is river erosion. Buckley Bar's mid-channel position and low elevation have made it particularly susceptible to flooding and flood erosion. The most marked consequence of these processes is the lack of structured cultural features. Only a single cluster of FMR in Zone 1 retained enough structural integrity to be regarded as a discrete feature. The second disturbance is vertical displacement by rodents. The upward and downward dispersion of a bead cache at 45-OK-18 showed that small artifacts from a

single occupation surface can be displaced vertically by as much as a meter in either direction (Jaehnig 1983). It is difficult to determine the extent of these disturbances; we will consider their effects in the following discussion.

The illustrations which accompany the discussion (Figures 5-2 through 5-5) are derived from computer generated distribution maps. The sample data has been mapped by alphanumeric codes for nine divisions of the cumulative frequency class counts. Divisions are adjusted so that score ranges are not overlapping and zero scores are always mapped as zero. The ninth division is broken down further by the use of letter codes for each score from highest to lowest. The interpretive figures present the locations of the letter codes and one or two of the highest density numeric codes. Units that were not zoned and units with no cultural material do not appear. Mean score, standard deviation and other statistics are also presented. Reference should also be made to Table 3-1 for frequencies of formal artifact categories. The complete distribution maps are included in Appendix D.

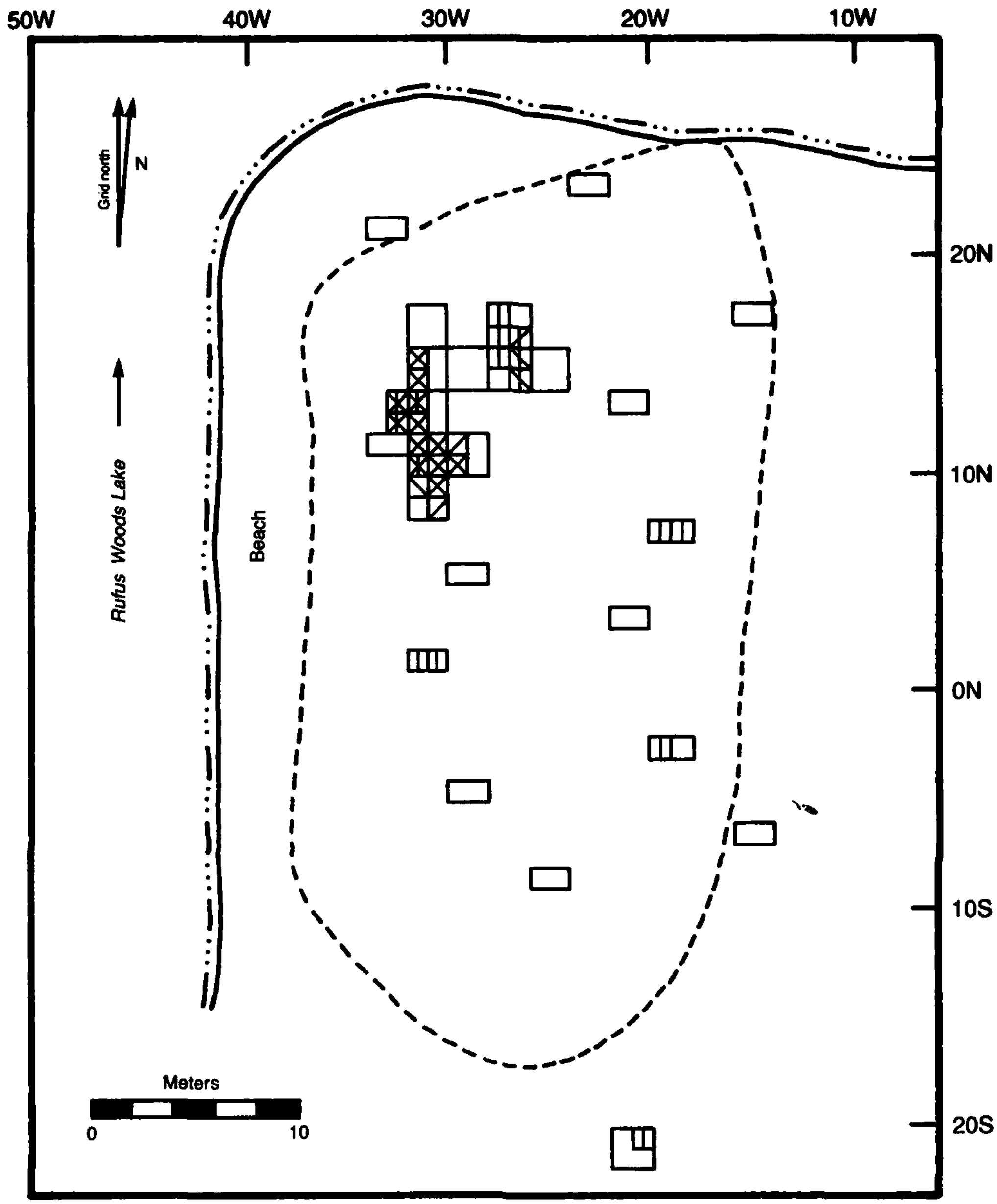
There are obvious differences in the vertical distribution of cultural material among the zones (Table 5-3). Zone 2 has significantly lower density and rate of artifact accumulation. It can be viewed as a period of less intense site use or of erosional erasure. If we accept the estimated time span represented by Zone 2, the first explanation is more likely. Supporting data include the low number of FMR from the zone, artifacts least likely to be displaced entirely from the site, and the low rate of matrix accumulation (Table 5-3). We cannot discount floods sometime after 2000 B.P. that were severe enough to scour most cultural material, including FMR, from the Bar while leaving the earlier deposits intact.

aTable 5-3. Artifact density and rate of artifact discard and matrix accumulation by zone, 45-DO-285.

Zone	Volume (m3)	Number of Artifacts	Density (Artifacts/ m3)	Artifacts/ 100 years	m3/ 100 years	cm/ 100 years
1	52.9	18,967	358.5	3793.4	10.58	14.7
2	26.3	6,526	248.1	435.1	1.75	2.4
3	29.0	22,380	771.7	4476.0	5.8	8.1
4	28.9	17,360	600.7	3472.0	5.78	7.8

ZONE 4

The distribution of the major artifact classes indicates two major centers of activity in the northwest block excavation (Figure 5-2). The larger, western area is marked by the coincidence of lithics, bone, and some units with high FMR concentrations. The eastern block area is marked primarily by FMR and lithics. The highest frequencies of FMR occur outside of the block to the south with no coincidence of high frequencies of other material classes. The four non-block FMR loci may be regarded as representing



	Range Shown	x̄	s.d.	N
Bone	136-583	97.9	132.7	7,050
Lithic	141-597	117.4	140.2	8,454
FMR	11-96	8.8	18.0	630

Figure 5-2. Distribution of major artifact classes, Zone 4, 45-DO-285.

single hearths. Some are more strongly associated with lithics than bone; others show little overlap of materials (Appendix D).

We interpret the distribution of Zone 4 as representing at east one area of generalized camp activity including game processing and lithic manufacture and maintenance. In addition, frequent short term temporary camps were probably occupied throughout the time span represented. The presence of a graver, drills, scrapers and tabular knives implies visits to the site long enough to allow processing of hides and other game by-products as well as manufacture of articles from them.

Recalling the frequency of argillite in this zone and the relatively greater proportion of bifaces in the assemblage, we suspect a greater emphasis on bifacial tool manufacture from this material. The primary material may have been available from the basal gravels. However, the lack of more cores and primary flakes is puzzling. A possible explanation is that major reduction took place elsewhere so that the assemblage primarily represents final manufacturing and modification of objects. This latter implication is supported by the proportions of argillite resharpening, unifacially retouched and bifacially retouched flakes.

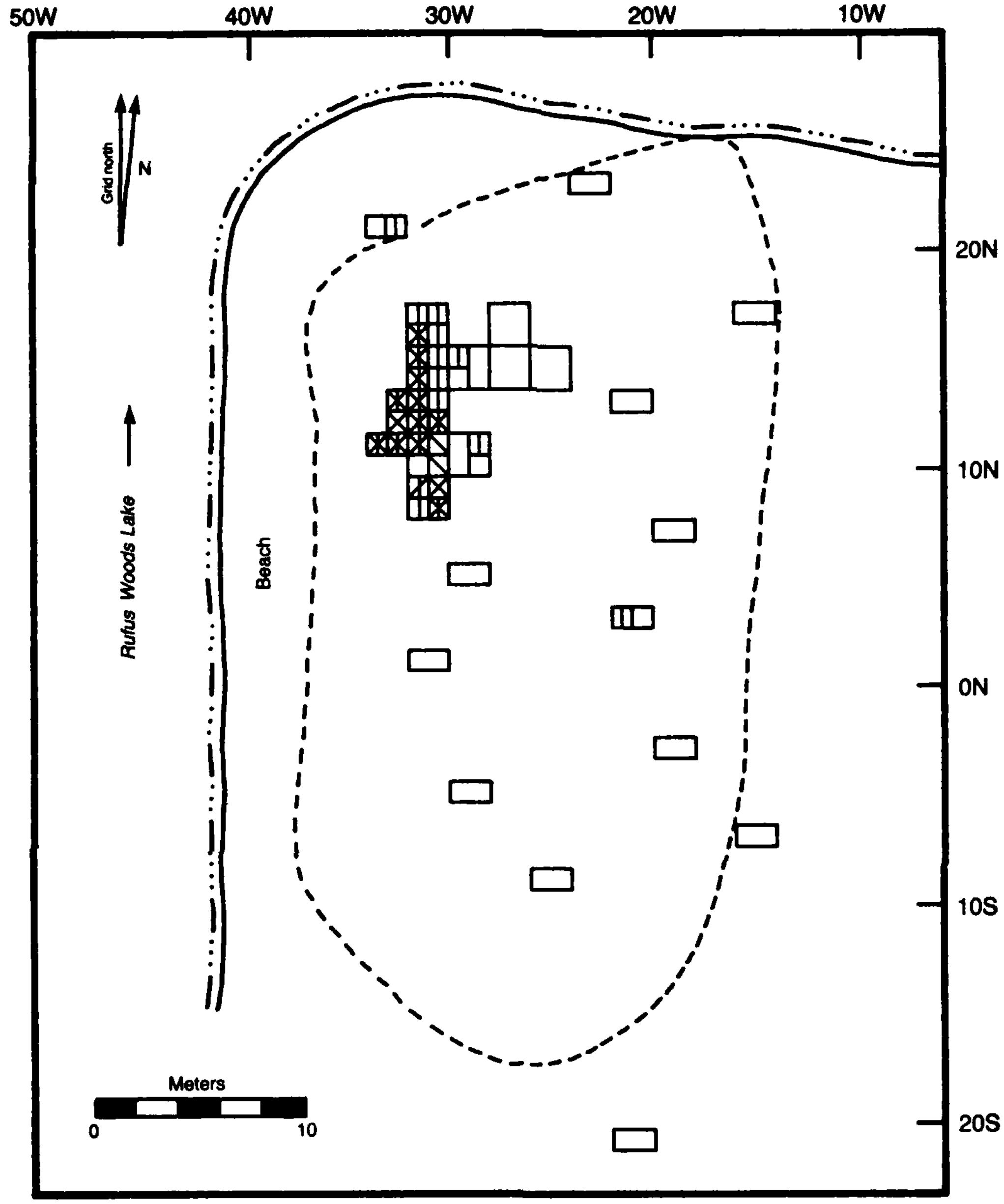
ZONE 3

Zone 3 shows coincidence of high material frequencies in the same western block area as Zone 4 (Figure 5-3). The area of FMR is slightly more extensive than in Zone 4 and there is separation of a southern locus within the block. The FMR also shows a single concentration to the north of the block and one to the southeast, suggesting two additional hearths.

Activities represented by the Zone 3 assemblage are similar to those of Zone 4. The emphasis remains on the processing of game and its by-products as represented by a burin, burin spalls, drills, a graver, a scraper and tabular knives. A decreased emphasis on argillite lithic manufacturing is suggested by the relatively lower proportions of bifaces and argillite in general. This zone represents the greatest intensity of site use as shown by the density figures and the rate of artifact accumulation (Table 5-3). We are not able to determine if the increased density is a result of more frequent site use or longer term use. The fact that more material comes from the block area with less evidence in other outlying units suggests we may be witnessing a period of repeated site use by larger groups and fewer visits by small transient parties.

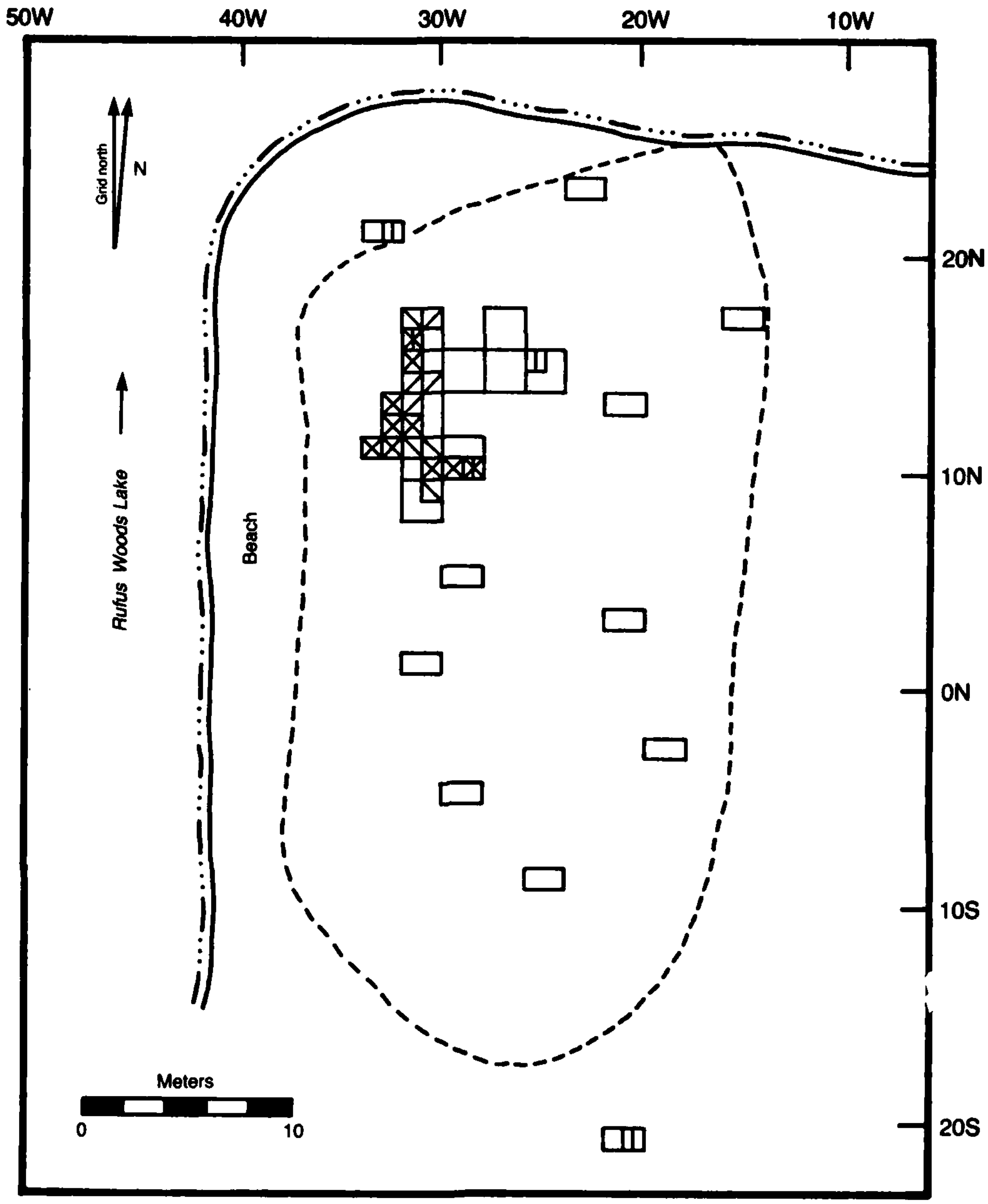
ZONE 2

Zone 2 again represents primary use of the northwest block area of the site (Figure 5-4). However, the correspondence in location for lithics, bone and FMR is not as pronounced as in the previous zones. FMR is relatively infrequent within the zone. The distributions of lithics and bone rarely correspond with the FMR. This pattern and the density of material overall suggests smearing from the bracketing zones and intermittent, infrequent site



	Range Shown	x̄	s.d.	N
Bone	203-1104	120.9	178.5	8,465
Lithic	302-795	165.4	189.0	11,578
FMR	14-52	9.9	11.5	692

Figure 5-3. Distribution of major artifact classes, Zone 3, 45-DO-285.



	Range Shown	x̄	s.d.	N
Bone	58-107	32.4	26.6	2,139
Lithic	101-174	56.6	47.3	3,734
FMR	3-22	1.0	2.9	64

Figure 5-4. Distribution of major artifact classes, Zone 2, 45-DO-285.

use in general. This interpretation is supported by the relatively few specialized formed objects and the near absence of worn/modified objects.

ZONE 1

Distributions for Zone 1 show a shift from the western to the northern portion of the block. Few of the units show coincidence of all artifact categories (Figure 5-5). FMR distributions suggest possible hearths in addition to in-block concentrations. Field designated Feature 7, the only structured FMR cluster, occurred in 2N32W. The feature consisted of a circular pile of 44 FMR. The rocks range from 5 to 15 cm in diameter and covered an area approximately 50 cm across (Figure 5-6). No associated charcoal staining or other evidence of fire was detected, suggesting the pile resulted from cleaning a fire pit or an earth oven. Only low frequencies of lithics and bone are associated with the feature adding little data to change this interpretation.

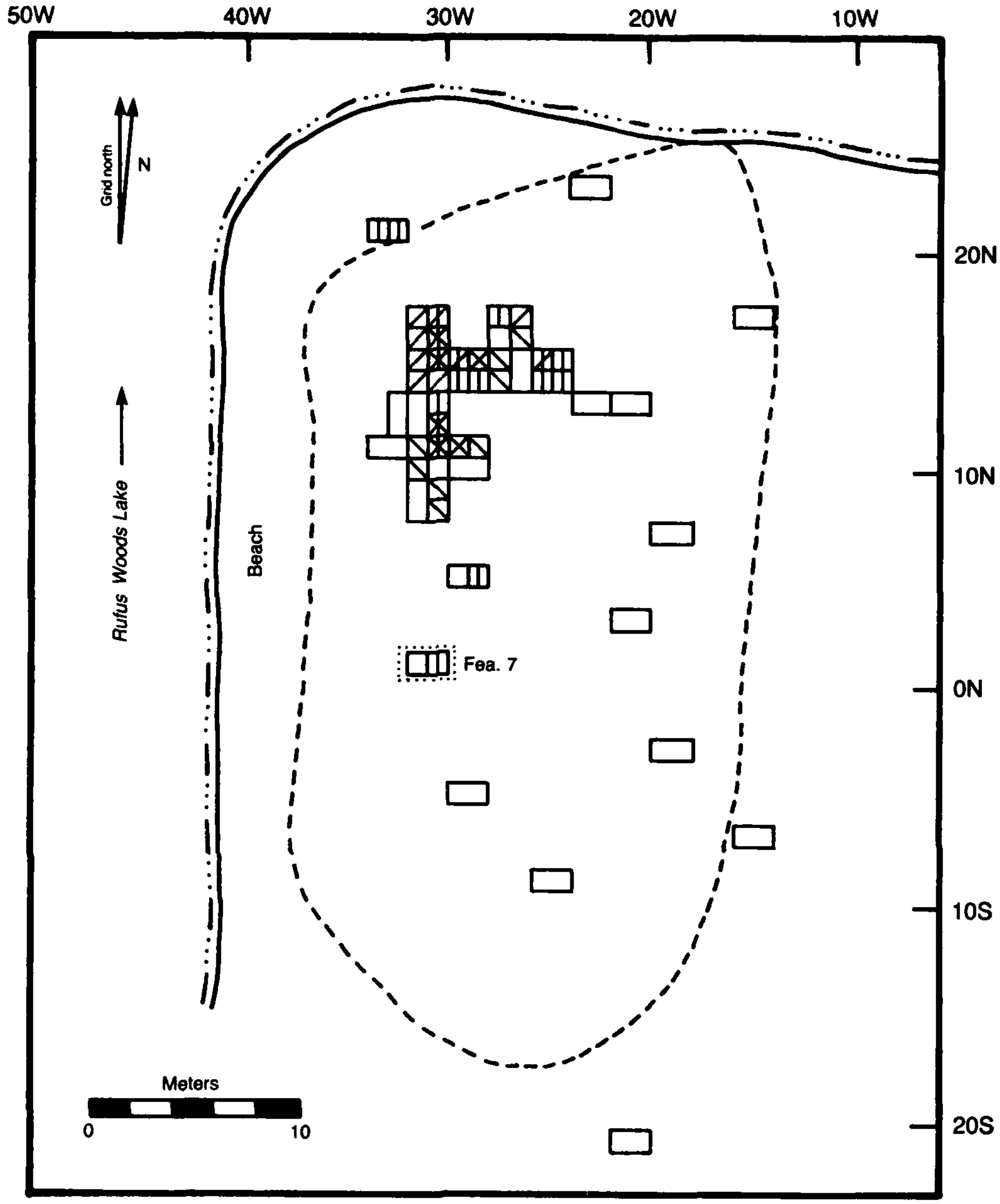
There appears to have been a resumption in site use in Zone 1 comparable in intensity to Zones 3 and 4; rate of artifact discard is similar although matrix accumulation was more rapid (Table 5-3). Comparison of the artifact assemblages suggests similar activities as well (Table 3-1). Projectile points, drills, gravers, scrapers, tabular knives and choppers indicate game processing. The bifaces, cores, specialized flakes and debitage suggest lithic manufacture and maintenance.

However, we have additional information from the faunal analysis showing the presence of Chinook salmon, fewer NISP for most of economic faunal species, and bone, in general, making up a slightly lower proportion of the Zone 1 assemblage. It appears that fishing had become a new economic pursuit in Zone 1 at 45-DO-285.

Notably, we can discern few contrasts between the tool assemblage in Zone 1 and Zone 3. There are small differences such as slightly higher proportions in Zone 1 of formed objects, specialized flakes, CCS, basalt and quartzite and a lower proportion of objects with wear and manufacture. There is no single distinctive artifact or group of characteristics to signal the addition of fishing to the activities represented at the site.

We cannot say whether this is due to sampling, to preservation, or to the secondary importance fishing held to the hunting and game processing activities represented in the zone. It is possible that fishing implements would have been recovered if more units had been excavated. There is the suggestion of broken fishing implements among the modified bone fragments recovered from Zone 1.

A possible hypothesis suggested by the assemblages and the distributional data is to propose seasonally differentiated activities for the site during this final period of use. Seasonal indicators have shown a fairly broad range of yearly use. The non-coincidence of the concentrations of the major artifact classes suggests occupation by groups with different pursuits. We may regard the occupations as functionally different and separated by a short period of time within the seasonal round. Hunting and game processing, the activities represented by the bulk of the assemblage, may have taken place in



	Range Shown	x̄	s.d.	N
Bone	140-374	92.1	78.6	6,634
Lithic	196-284	132.1	79.0	9,513
FMR	15-57	12.1	13.0	872

Figure 5-5. Distribution of major artifact classes, Zone 1, 45-DO-285.

the spring followed by re-occupation later in the summer for the Chinook salmon runs. These visits may also, of course, have involved incidental hunting in addition to fishing.

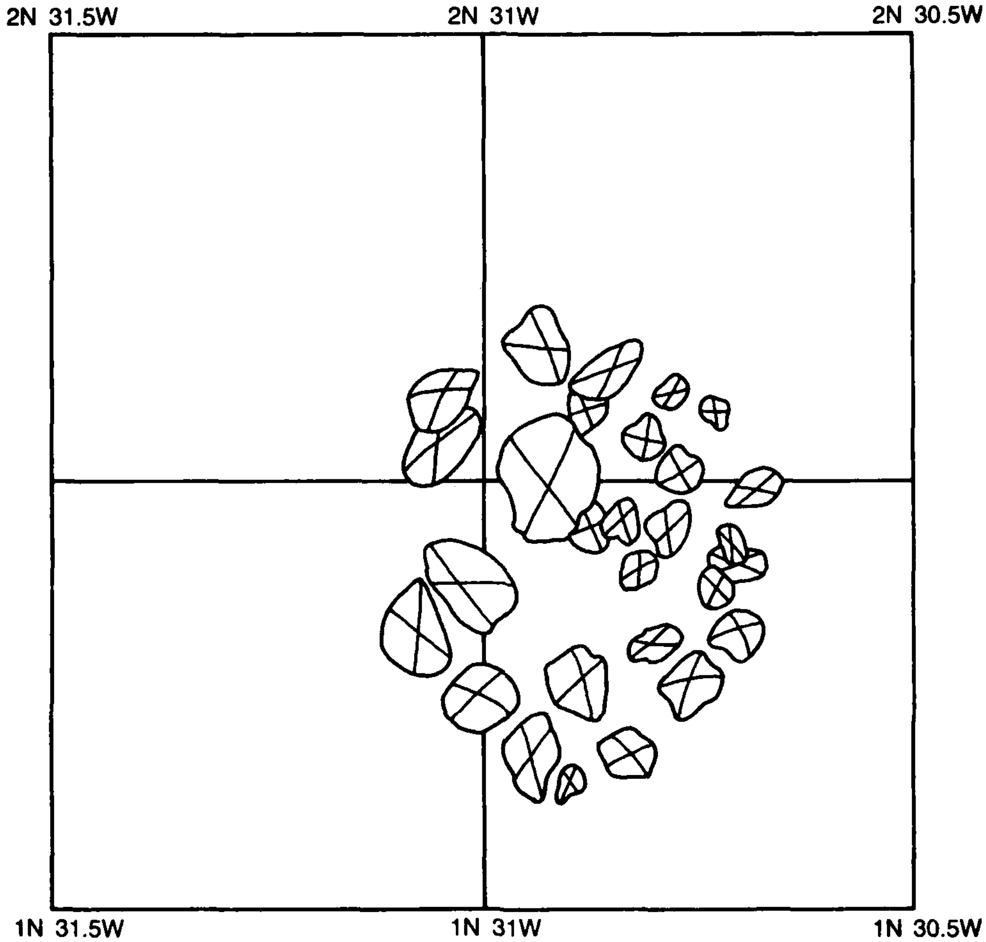


Figure 5-6. Plan map of FMR concentration in Zone 1 (Feature 7), 45-DO-285.

SUMMARY AND CONCLUSIONS

Our analyses have indicated both continuity and contrast among the cultural analytic zones of 45-DO-285. Throughout its use, the site and its contents have been affected by fluvial processes. Perhaps the greatest legacy of the river has been the disruption of structured cultural features that would have aided us in defining discrete occupational episodes. The river and its depositional and erosional processes may have strongly influenced the function and use of the site through time as well.

The artifact analyses have shown continuity in techniques of manufacture and use of raw materials among the analytic zones. Use of tools for similar tasks is also apparent. The most striking contrast detected is the greater frequency in Zone 4 of argillite for finely flaked objects. Less obvious is the quantitative difference among artifact types between the lower and upper zones. This contrast has been associated with information from the faunal analysis to suggest changes in subsistence emphasis through time. The recovery of Chinook salmon from Zone 1 suggests the addition of this activity to a long standing pattern of use of 45-DO-285 as a base and transient camp for the hunting of large game.

We previously raised the question of why there is no firm evidence of fishing at 45-DO-285 in earlier deposits when nearby sites show this activity to have been important relatively early. We can suggest several possible explanations involving geographic site setting and functional interpretation.

First we must recall that salmon bone was recovered from all of the analytic zones and primary deposition was attributed to Zone 1 because of its much higher frequency. If, on the other hand, we assume primary deposition in the lower zones as well, we are faced with explaining its relative rarity. It is not out of the question to propose that most major fish processing may have occurred elsewhere. Site 45-DO-285's location on the western shoulder of Buckley Bar was approximately 500 m upstream from the northern tip which provided access to Monaghan Rapids. The site is thus somewhat removed from the major fishing activity at the rapids, but may have been a convenient camping area for those using the rapids. The location provides easier access to mainland resources such as fuel and game. The portion of the bar north of the site was somewhat lower in elevation and may have been seasonally inundated and denuded of vegetation making it a less attractive camp area.

An analogous situation has been proposed for the Ksunku site on Hayes Island at Kettle Falls (Chance and Chance 1982). The Ksunku site is located at the north end of the island where access by boat is easiest. Although faunal remains were poorly preserved, there are striking differences in frequencies of tool classes between the north and south ends of the island. Quartzite scrapers, associated with game processing, are more frequent at the northern site than in contemporary deposits to the south, suggesting game was processed there rather than transported south. People using Buckley Bar may have acted in a similar manner, accounting for the rarity of evidence of fishing and the predominance of hunting and game processing activities in all zones at 45-DO-285.

Another possible explanation for the paucity of data on fishing in the lower zones is associated with the formation of the point bar and its proximity to Monaghan Rapids. The meandering of an active river with variable flows may have influenced activities at the site. Our data show continuous deposition of the bar. We cannot determine if the northern portion provided access to the rapids only during the period represented by Zone 1. In fact, the location and even the existence of the rapids themselves may not have been constant throughout the period of time that 45-DO-285 was used. We can propose that coincidence of the rapids and accessibility to them were fairly

recent developments. From evidence from nearby sites, we know that fish were a resource and the technology existed to exploit them prior to 3000 B.P.

Finally, from the data at hand, we have no way to assess the influence of environmental factors, such as stream sediment loads, which may have interrupted anadromous fish runs as suggested for the post-Shonitkwu (after 8000 B.P.) and Sinaikst (1700-500 B.P.) periods at Kettle Falls (Chance and Chance 1982:423,426).

Regardless of which explanation is favored to account for lack of evidence of fishing in the earlier zones, the data as it stands shows a difference in subsistence emphasis between the earlier and later occupations. The distributional and density information also give broad indications of patterns and intensity of site use which vary through time.

The Hudnut and Coyote Creek Phase designations place the occupations at 45-DO-285 relative to phases at Sunset Creek (Nelson 1969), Wells Reservoir (Grabert 1968) and Kettle Falls (Chance and Chance 1979) (see Table 3-23). All show similarities among projectile point styles and other tools.

Briefly, the Quilomene Bar/Frenchman's Springs and Indian Dan Phases, with which the Hudnut Phase correlates, indicate seasonal hunting and gathering with little evidence of winter village habitation or fishing. The Cayuse and Chiliwist Phases, with which the Coyote Creek Phase correlates, represent a shift in subsistence emphasis attributed to the introduction of more efficient fish storage and procurement technology. The increased efficiency allowed the development of the ethnographic winter village pattern.

On first examination, the occupations at 45-DO-285 seem to follow the general trends outlined for phases elsewhere on the Plateau. There are similarities in raw materials, projectile point styles, and an apparent shift from hunting to fishing. However, we must temper this correlation with information from the excavation of other sites in the project area. Housepit components are known from the preceding Kartar Phase and early Hudnut Phase. Similarly, there is evidence of fishing from at least 5,000 years ago and additional evidence from Kettle Falls of fishing extending back 8-9,000 years (Chance and Chance, 1982). With this evidence, we are unable to say that the winter village pattern and fishing technology are as definitively associated as other regional schemes imply.

In this context, we may view the occupation at 45-DO-285 as evidence of another segment of a well-established river-oriented settlement pattern. The site provides information about seasonal activities not directly associated with villages and structures.

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APPENDIX A:

RADIOCARBON DATE SAMPLES, 45-DO-285

Table A-1. Radiocarbon date samples, 45-DO-285.

Lab Sample #[1]	Zone	DU	Stratum	Unit	Level	Feature #	Material/gms	Radiocarbon Age (Y.B.P.) T1/2=5730	Dendrocorrected Age (Y.B.P.)[2]
TX-3051	3	III	300	15N34W	110	-	Charcoal/1.5	1741±950	1680±950
	This date is from testing.								
TX-4179	1	III	150	15N30W	50	38	Charcoal/6.5	280±90	289±90
	Feature 38 = unstructured FMR scatter. Excavated as content feature.								
TX-4180	1	III	150	15N31W	40	2	Charcoal/7.0	340±80	350±80
	Feature 2 = 28 FMR with few associated artifacts and no distinctive associated matrix. Excavated as content feature.								

1 TX samples were dated by University of Texas-Austin, Radiocarbon Laboratory.

2 Dendrocorrected according to Damon et al. (1974).

APPENDIX B:

ARTIFACT ASSEMBLAGE, 45-DO-285

Table B-1. Technological dimensions.

DIMENSION I: OBJECT TYPE

Conchoidal flake
Chunk
Core
Linear flake
Unmodified
Tabular flake
Formed object
Weathered
Indeterminate

DIMENSION II: RAW MATERIAL

Jasper
Chalcedony
Petrified Wood
Obsidian
Opal*
Quartzite
Fine-grained quartzite
Basalt
Fine-grained basalt
Silicized mudstone
Argillite
Granite
Siltstone/mudstone
Schist
Bone/antler
Ochre
Shell
Dentalium

DIMENSION III: CONDITION

Complete
Proximal fragment
Proximal flake
Less than 1/4 inch
Broken
Indeterminate

DIMENSION IV: DORSAL TOPOGRAPHY

None
Partial cortex
Complete cortex
Indeterminate/not applicable

DIMENSION V: TREATMENT

Definitely burned
Dehydrated [heat treatment]

ATTRIBUTE I: WEIGHT

Recorded weight in grams

ATTRIBUTE II: LENGTH

Flakes: length is measured between the point of impact and the distal end along the bulbar axis

Other: length is taken as the longest dimension

ATTRIBUTE III: WIDTH

Flakes: width is measured at the widest point perpendicular to the bulbar axis

Other: width is taken as the maximum measurement along an axis perpendicular to the axis of length

ATTRIBUTE IV: THICKNESS

Flakes: thickness is taken at the thickest point on the object, excluding the bulb of percussion and the striking platform

Other: thickness is taken as the measurement perpendicular to the width measurement along an axis perpendicular to the axis of length

* This category not used at this site.

Table B-2. Size attributes of cryptocrystalline conchoidal flakes, 45-DO-285.

Conchoidal Flakes		Zone				Total
Attribute	Statistic	1	2	3	4	
Length (mm)	$\bar{x}$	9.9	10.7	10.8	10.4	10.4
	s.d.	5.2	5.4	5.6	5.1	5.3
	N	2,892	1,122	3,245	1,857	9,116
Width (mm)	$\bar{x}$	9.5	10.5	10.6	10.0	10.2
	s.d.	5.0	5.4	5.8	4.8	5.3
	N	3,069	1,220	3,681	2,146	10,116
Thickness (.1mm)	$\bar{x}$	18.8	20.3	20.4	18.7	19.5
	s.d.	13.0	14.3	14.0	11.8	13.3
	N	5,488	2,110	6,250	3,998	17,846
Weight (.1gm)	$\bar{x}$	2.9	3.2	3.3	2.7	3.0
	s.d.	12.7	7.4	7.7	6.3	9.2
	N	7,709	3,102	9,398	5,698	25,907
Length:Width Ratio		1.04	1.02	1.02	1.04	1.02

Table B-3. Size attributes of argillite conchoidal flakes, 45-DO-285.

Conchoidal Flakes		Zone				Total
Attribute	Statistic	1	2	3	4	
Length (mm)	$\bar{x}$	10.4	9.1	9.7	9.9	9.8
	s.d.	8.5	3.4	4.2	4.9	5.0
	N	82	81	325	465	953
Width (mm)	$\bar{x}$	10.4	8.9	10.0	10.6	10.2
	s.d.	4.5	3.2	4.6	5.0	4.7
	N	94	98	390	555	1,137
Thickness (.1mm)	$\bar{x}$	18.8	14.6	16.0	16.8	16.5
	s.d.	13.2	6.6	8.5	8.5	8.9
	N	184	187	771	1,217	2,359
Weight (.1gm)	$\bar{x}$	3.3	1.7	2.3	2.5	2.4
	s.d.	13.7	2.1	4.2	4.4	5.6
	N	285	281	1,157	1,845	3,568
Length:Width Ratio		1.00	1.02	0.97	0.93	0.96

Table B-4. Size attributes of coarse-grained quartzite conchoidal flakes, 45-DO-285.

Conchoidal Flakes		Zone				Total
Attribute	Statistics	1	2	3	4	
Length (mm)	$\bar{x}$	15.4	11.8	19.7	12.9	15.5
	s.d.	13.7	10.5	16.1	10.6	13.5
	N	30	9	19	15	73
Width (mm)	$\bar{x}$	18.8	11.6	22.7	17.1	18.6
	s.d.	16.6	10.1	16.0	14.4	15.4
	N	26	9	19	15	69
Thickness (.1mm)	$\bar{x}$	36.9	29.4	48.6	33.7	38.5
	s.d.	50.0	30.9	53.0	28.6	45.5
	N	42	10	25	19	96
Weight (.1gm)	$\bar{x}$	59.3	15.7	43.6	24.3	43.0
	s.d.	175.7	46.8	118.2	56.9	132.0
	N	51	12	31	28	122
Length:Width Ratio		0.82	1.02	0.87	0.75	0.83

Table B-5. Size attribute of fine-grained quartzite conchoidal flakes, 45-DO-285.

Conchoidal Flakes		Zone				Total
Attribute	Statistics	1	2	3	4	
Length (mm)	$\bar{x}$	11.9	11.2	15.8	15.6	13.3
	s.d.	7.8	4.0	13.9	11.7	9.7
	N	35	6	11	14	66
Width (mm)	$\bar{x}$	14.2	10.7	19.9	11.7	14.6
	s.d.	9.7	5.0	19.6	6.2	11.8
	N	29	3	12	14	58
Thickness (.1mm)	$\bar{x}$	35.5	28.3	52.9	26.1	36.0
	s.d.	32.6	11.6	80.4	16.5	42.9
	N	61	10	22	26	119
Weight (.1gm)	$\bar{x}$	12.0	6.1	41.9	8.5	15.6
	s.d.	41.1	8.1	148.2	20.9	68.1
	N	113	18	35	48	214
Length:Width Ratio		0.84	1.05	0.79	1.33	0.91

Table B-6. Size attributes of basalt and obsidian conchoidal flakes, 45-DO-285.

Conchoidal Flakes		Zone									
Attribute	Statistics	1		2		3		4		Total	
		Bas	Obs	Bas	Cbs	Bas	Obs	Bas	Obs	Bas	Obs
Length (mm)	$\bar{x}$	15.1	6.0	8.5	0.0	11.7	7.5	15.0	9.6	13.7	8.4
	s.d.	12.7	0.0	3.4	0.0	5.2	1.0	18.9	4.1	14.0	3.3
	N	22	2	8	-	10	4	24	7	64	13
Width (mm)	$\bar{x}$	15.4	7.5	9.6	7.0	10.9	7.2	15.4	8.3	13.9	7.8
	s.d.	11.9	0.7	3.2	0.0	3.6	1.3	8.8	1.7	8.9	1.4
	N	21	2	7	1	15	4	27	7	70	14
Thickness (.1mm)	$\bar{x}$	30.4	11.0	22.3	14.0	24.7	12.3	28.6	13.7	27.9	13.0
	s.d.	20.9	2.0	9.2	0.0	9.6	1.8	23.0	4.3	19.3	3.4
	N	36	3	9	1	20	10	39	17	104	31
Weight (.1gm)	$\bar{x}$	13.0	1.0	4.7	1.2	4.6	1.0	13.2	1.3	10.2	1.2
	s.d.	42.2	0.0	6.3	0.5	7.4	0.0	68.5	0.6	45.9	0.5
	N	82	6	20	4	62	19	76	28	240	57
Length:Width Ratio		0.98	0.8	0.89	-	1.07	1.04	0.97	1.16	0.99	1.08

Table B-7. Kinds of debitage by material type and zone, 45-DO-285.

Material / Kind	Zone 1	Zone 2	Zone 3	Zone 4	Total
Cryptocrystalline Silicates					
Conchoidal flakes	9,261	3,570	10,692	6,518	30,041
Tabular flakes	2	–	–	–	2
Chunk	453	144	434	269	1,300
Weathered	2	–	3	3	8
Argillite					
Conchoidal flakes	325	323	1,304	2,092	4,044
Tabular flakes	1	–	–	–	1
Chunk	1	1	7	8	17
Quartzite					
Conchoidal flakes	51	15	38	31	135
Tabular flakes	611	102	213	306	1,232
Chunk	30	5	15	13	63
Weathered	–	–	–	1	1
Fine-Grained Quartzite					
Conchoidal flakes	116	19	36	48	219
Tabular flakes	15	3	6	7	31
Chunk	12	5	15	16	48
Weathered	–	–	1	–	1
Basalt					
Conchoidal flakes	82	23	66	79	250
Chunk	8	1	4	3	16
Obsidian					
Conchoidal flakes	6	5	19	33	63
Chunk	1	–	–	1	2
Granitic					
Conchoidal flakes	2	2	5	1	10
Tabular flakes	2	–	–	–	2
Other Lithic					
Conchoidal flakes	13	10	35	26	84
Tabular flakes	2	–	4	6	12
Chunk	6	3	2	5	16
Indeterimnate Lithic					
Conchoidal flakes	5	3	1	2	11
Chunk	4	–	9	1	14

Table B-8. Count of primary and secondary debitage by material type and zone, 45-DO-285.

Material	Zone 1	Zone 2	Zone 3	Zone 4	Total[1]
Cryptocrystalline Silices					
Primary	470	147	442	277	1,336
Secondary	7,235	2,848	8,782	5,300	24,165
Indeterimnate	295	197	476	272	1,240
Argillite					
Primary	5	4	13	14	36
Secondary	272	270	1,131	1,789	3,462
Indeterminate	7	6	15	31	59
Quartzite					
Primary	211	32	91	121	455
Secondary	415	71	155	195	836
Indeterminate	3	3	1	1	8
Fine-Grained Quartzite					
Primary	28	3	17	25	73
Secondary	104	18	37	44	203
Indeterminate	5	–	2	2	9
Basalt					
Primary	21	4	9	9	43
Secondary	65	17	54	69	205
Indeteriminate	1	–	3	–	4
Obsidian					
Primary	1	–	–	1	2
Secondary	5	4	18	27	54
Granitic					
Primary	3	–	2	–	5
Secondary	1	2	3	1	7
Other Lithic					
Primary	6	3	2	5	16
Secondary	11	5	31	19	66
Indeterminate	4	5	8	13	30
Indeterminate Lithic					
Primary	4	–	9	1	14
Secondary	2	3	1	1	7
Indeterminate	3	–	–	1	4

[1] Does not include <1/4 in flakes.

Table B-9. Frequency of <1/4 in flakes by material type and zone, 45-DO-285.

Material Type	Zone 1	Zone 2	Zone 3	Zone 4	Total
Jasper	1,380	469	1,324	812	3,975
Chalcedony	336	54	109	138	637
Petrified wood	2	–	–	1	3
Argillite	43	44	152	268	507
Quartzite	63	16	20	33	132
Fine-grained quartzite	6	1	1	–	8
Basalt	1	1	4	3	9
Fine-grained basalt	2	2	–	1	5
Obsidian	1	1	1	6	9

Table B-10. Count of heat treatment by zone, 45-DO-285.

Treatment	Zone 1	Zone 2	Zone 3	Zone 4	Total[1]
None	9,270	3,615	11,200	8,248	32,333
Col %	97.3	96.7	96.6	97.5	97.1
Burned	237	115	368	186	906
Col %	2.5	3.1	3.2	2.2	2.7
Dehydrated	17	7	22	25	71
Col %	0.2	0.2	0.2	0.3	0.2
TOTAL	9,524	3,737	11,590	8,459	33,310

[1] <1/4 in flakes and non-lithics deleted

Table B-11. Count of condition by zone, 45-DO-285.

Condition	Zone 1	Zone 2	Zone 3	Zone 4	Total[1]
Complete	2,316	879	2,564	1,661	7,420
Col %	24.3	23.5	22.1	19.6	22.3
Proximal fragment	2,388	923	2,895	2,270	8,476
Col %	25.1	24.7	25.0	26.8	25.4
Proximal flake	696	280	936	684	2,596
Col %	7.3	7.5	8.1	8.1	7.8
Broken	3,796	1,519	4,801	3,594	13,710
Col %	39.9	40.6	41.4	42.5	41.2
Indeterminate	328	136	394	250	1,108
Col %	3.4	3.6	3.4	3.0	3.3
TOTAL	9,524	3,737	11,590	8,459	33,310

[1] <1/4 in flakes and non-lithics deleted

Table B-12. Functional dimensions.

DIMENSION I: UTILIZATION/MODIFICATION

- None
- Wear only
- Manufacture only
- Manufacture and wear
- Modified/indeterminate
- Indeterminate

DIMENSION II: TYPE OF MANUFACTURE

- None
- Chipping
- Packing
- Grinding
- Chipping and pecking
- Chipping and grinding
- Pecking and grinding
- Chipping, pecking, grinding
- Indeterminate/not applicable

DIMENSION III: MANUFACTURE DISPOSITION

- None
- Partial
- Total
- Indeterminate/not applicable

DIMENSION IV: WEAR CONDITION

- None
- Complete
- Fragment

DIMENSION V: WEAR/MANUFACTURE RELATIONSHIP

- None
- Independent
- Overlapping - total
- Overlapping - partial
- Independent - opposite
- Indeterminate/not applicable

DIMENSION VI: KIND OF WEAR

- Abrasion/grinding
- Smoothing
- Crushing/pecking
- Polishing

DIMENSION VI: Continued

- Feathered chipping
- Feathered chipping/abrasion
- Feathered chipping/smoothing
- Feathered chipping/crushing
- Feathered chipping/polishing
- Hinged chipping
- Hinged chipping/abrasion
- Hinged chipping/smoothing
- Hinged chipping/crushing
- Hinged chipping/polishing
- None

DIMENSION VII: LOCATION OF WEAR

- Edge only
- Unifacial edge
- Bifacial edge
- Point only
- Point and unifacial edge
- Point and bifacial edge
- Point and any combination
- Surface
- Terminal surface
- None

DIMENSION VIII: SHAPE OF WORN AREA

- Not applicable
- Convex
- Concave
- Straight
- Point
- Notch
- Slightly convex
- Slightly concave
- Irregular

DIMENSION IX: ORIENTATION OF WEAR

- Not applicable
- Parallel
- Oblique
- Perpendicular
- Diffuse
- Indeterminate

DIMENSION X: OBJECT EDGE ANGLE

- Actual edge angle

Table B-13. Count of utilization and manufacture by zone, 45-DO-285.

Utilization and manufacture	Zone				Total[1]
	1	2	3	4	
None	9,189	3,644	11,325	8,229	32,387
Col %	96.5	97.5	97.7	97.3	97.2
Wear only	167	53	118	101	439
Col %	1.8	1.4	1.0	1.2	1.3
Manufacture only	85	19	80	62	246
Col %	0.9	0.5	0.7	0.7	0.7
Wear and manufacture	60	21	62	63	206
Col %	0.6	0.6	0.5	0.7	0.6
Modified/indeterminate	22	0	4	3	29
Col %	0.2	0.0	0.0	0.0	0.1
Indeterminate	1	0	1	1	3
Col %	0.0	0.0	0.0	0.0	0.0
TOTAL	9,524	3,737	11,590	8,459	33,310

[1] <1/4 in flakes and non-lithics deleted

Examination of the wear types recorded for 45-DO-285 indicated that the divisions of the dimensions were unneccessarily fine. To facilitate analysis, certain categories were combined. The following list shows which categories were combined and Tables B-15 through B-20 show the distribution of the original categories by zone and cross-correlated with each other.

1. Kind of wear

Smoothing: The following were included in the smoothing category on the premise that they result from similar sorts of activities. In the case of the feathered and hinged chipping, smoothing is the final result of use.

a. Abrasion/grinding
b. Feathered chipping and smoothing
c. Hinged chipping and smoothing

2. Location of wear

Point:

a. Point only
b. Point, unifacial
c. Point and 2 edges

Surface:

a. Surface
b. Terminal surface

3. Shape of worn area

Convex:

a. Convex
b. Mildly convex

Concave:

a. Concave
b. Mildly concave

Table B-14. Count of manufacture disposition by zone, 45-DO-285.

Manufacture disposition	Zone 1	Zone 2	Zone 3	Zone 4	Total
None	9,356	3,697	11,443	8,330	32,826
Col %	98.2	98.9	98.7	98.5	98.5
Partial	122	35	119	114	390
Col %	1.3	0.9	1.0	1.3	1.2
Total	23	5	23	11	62
Col %	0.2	0.1	0.2	0.1	0.2
Indeterminate	23	0	5	4	32
Col %	0.2	0.0	0.0	0.0	0.1
TOTAL	9,524	3,737	11,590	8,459	33,310

Table 15. Kind of wear by zone, 45-DO-285

Kind of wear	Zone 1	Zone 2	Zone 3	Zone 4	Total[1]
Abrasion/ grinding	0	1	0	1	2
Col %	0.0	1.1	0.0	0.4	0.2
Smoothing	13	4	13	7	37
Col %	4.3	4.3	5.5	3.0	4.3
Crushing/ pecking	21	0	11	2	34
Col %	7.0	0.0	4.7	0.9	4.0
Feathered chipping	175	55	137	134	501
Col %	58.3	59.1	58.3	57.8	58.3
Feathered chipping/ smoothing	7	1	9	16	33
Col %	2.3	1.1	3.8	6.9	3.8
Hinged chipping	75	30	55	67	227
Col %	25.0	32.3	23.4	28.9	26.4
Hinged chipping/ smoothing	9	2	9	5	25
Col %	3.0	2.2	3.8	2.2	2.9
Hinged chipping/ crushing	0	0	1	0	1
Col %	0.0	0.0	0.4	0.0	0.1
TOTAL	300	93	235	232	860

[1] Non-lithic materials deleted

Table B-16. Location of wear by zone, 45-DO-285.

Location of wear	Zone				Total[1]
	1	2	3	4	
Edge only	9	1	12	4	26
Col %	3.0	1.1	5.1	1.7	3.0
Unifacial edge	237	85	182	190	694
Col %	79.0	91.4	77.4	81.9	80.7
Bifacial edge	28	6	24	31	89
Col %	9.3	6.5	10.2	13.4	10.3
Point only	1	0	1	1	3
Col %	0.3	0.0	0.4	0.4	0.3
Point/two edges	6	1	6	4	17
Col %	2.0	1.1	2.6	1.7	2.0
Surface	0	0	1	0	1
Col %	0.0	0.0	0.4	0.0	0.1
Terminal surface	19	0	9	2	30
Col %	6.3	0.0	3.8	0.9	3.5
TOTAL	300	93	235	232	860

[1] Non-lithic materials deleted

Table B-17. Shape of worn area by zone, 45-DO-285.

Shape of worn area	Zone				Total[1]
	1	2	3	4	
Convex	44	14	40	31	129
Col %	14.7	15.1	17.0	13.4	15.0
Concave	14	3	10	14	41
Col %	4.7	3.2	4.3	6.0	4.8
Straight	126	35	90	103	354
Col %	42.0	37.6	38.3	44.4	41.2
Point	7	1	7	5	20
Col %	2.3	1.1	3.0	2.2	2.3
Slightly convex	78	20	64	60	222
Col%	26.0	21.5	27.2	25.9	25.8
Slightly concave	31	20	23	19	93
Col %	10.3	21.5	9.8	8.2	10.8
Irregular	0	0	1	0	1
Col %	0.0	0.0	0.4	0.0	0.1
TOTAL	300	93	235	232	860

[1] Non-lithic materials deleted

Table B-18. Kind of wear by location of wear, 45-DO-285.

Kind of wear	Edge only	Unifacial edge	Bifacial edge	Point only	Point two edges	Surface	Terminal surface	Total[1]
Abrasion/grinding	-	2	-	-	-	-	-	2
Row %	0.0	100.0	0.0	0.0	0.0	0.0		
Col %	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.2
Total %	0.0	0.2	0.0	0.0	0.0	0.0	0.0	
Smoothing	25	2	8	2	-	-	-	37
Row %	67.6	5.4	21.6	5.4	0.0	0.0	0.0	
Col %	96.2	0.3	9.0	66.7	0.0	0.0	0.0	4.3
Total %	2.9	0.2	0.9	0.2	0.0	0.0	0.0	
Crushing/pecking	1	-	0	-	-	1	30	34
Row %	2.9	0.0	5.9	0.0	0.0	2.9	88.2	
Col %	3.8	0.0	2.2	0.0	0.0	100.0	100.0	4.0
Total %	0.1	0.0	0.2	0.0	0.0	0.1	3.5	
Feathered chipping	-	455	41	-	5	-	-	501
Row %	0.0	90.8	8.2	0.0	1.0	0.0	0.0	
Col %	0.0	65.6	46.1	0.0	29.4	0.0	0.0	58.3
Total %	0.0	52.9	4.8	0.0	0.6	0.0	0.0	
Feathered chipping/ smoothing	-	18	10	1	4	-	-	33
Row %	0.0	54.5	30.3	3.0	12.1	0.0	0.0	
Col %	0.0	2.6	11.2	33.3	23.5	0.0	0.0	3.8
Total %	0.0	2.1	1.2	0.1	0.5	0.0	0.0	
Hinged chipping	-	202	22	-	3	-	-	227
Row %	0.0	89.0	9.7	0.0	1.3	0.0	0.0	
Col %	0.0	29.1	24.7	0.0	17.6	0.0	0.0	26.4
Total %	0.0	23.5	2.6	0.0	0.3	0.0	0.0	
Hinged chipping/ smoothing	-	14	6	-	5	-	-	25
Row %	0.0	56.0	24.0	0.0	20.0	0.0	0.0	
Col %	0.0	2.0	6.7	0.0	29.4	0.0	0.0	2.9
Total %	0.0	1.6	0.7	0.0	0.6	0.0	0.0	
Hinged chipping/ crushing	-	1	-	-	-	-	-	1
Row %	0.0	100.0	0.0	0.0	0.0	0.0	0.0	
Col %	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1
Total %	0.0	0.1	0.0	0.0	0.0	0.0	0.0	
TOTAL	26	694	89	3	17	1	30	860
Row %	3.0	80.7	10.3	0.3	2.0	0.1	3.5	

[1] Non-lithic materials deleted

Table B-19. Kind of wear by shape of worn area, 45-DO-285.

Kind of wear	Convex	Concave	Straight	Point	Mildly convex	Mildly concave	Irregular	Total[1]
Abrasion/grinding	1	-	-	-	1	-	-	2
Row %	50.0	0.0	0.0	0.0	50.0	0.0	0.0	
Col %	0.8	0.0	0.0	0.0	0.5	0.0	0.0	0.2
Total %	0.1	0.0	0.0	0.0	0.1	0.0	0.0	
Smoothing	17	-	9	2	9	-	-	37
Row %	45.9	0.0	24.3	5.4	24.3	0.0	0.0	
Col %	13.2	0.0	2.5	10.0	4.1	0.0	0.0	4.3
Total %	2.0	0.0	1.0	0.2	1.0	0.0	0.0	
Crushing/pecking	27	-	3	-	1	3	-	34
Row %	79.4	0.0	8.8	0.0	2.9	8.8	0.0	
Col %	20.9	0.0	0.8	0.0	0.5	3.2	0.0	4.0
Total %	3.1	0.0	0.3	0.0	0.1	0.3	0.0	
Feathered chipping	49	28	229	5	127	63	-	501
Row %	9.8	5.6	45.7	1.0	25.3	12.6	0.0	
Col %	38.0	68.3	64.7	25.0	57.2	67.7	0.0	58.3
Total %	5.7	3.3	26.6	0.6	14.8	7.3	0.0	
Feathered chipping/ smoothing	7	-	8	5	13	-	-	33
Row %	21.2	0.0	24.2	15.2	39.4	0.0	0.0	
Col %	5.4	0.0	2.3	25.0	5.9	0.0	0.0	3.8
Total %	0.8	0.0	0.9	0.6	1.5	0.0	0.0	
Hinged chipping	24	13	100	3	60	26	1	227
Row %	10.6	5.7	44.1	1.3	26.4	11.5	0.4	
Col %	18.6	31.7	28.2	15.0	27.0	28.0	100.0	26.4
Total %	2.8	1.5	11.6	0.3	7.0	3.0	0.1	
Hinged chipping/ smoothing	4	-	5	5	10	1	-	25
Row %	16.0	0.0	20.0	20.0	40.0	4.0	0.0	
Col %	3.1	0.0	1.4	25.0	4.5	1.1	0.0	2.9
Total %	0.5	0.0	0.6	0.6	1.2	0.1	0.0	
Hinged chipping/ crushing	-	-	-	-	1	-	-	1
Row %	0.0	0.0	0.0	0.0	00.0	0.0	0.0	
Col %	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.1
Total %	0.0	0.0	0.0	0.0	0.1	0.0	0.0	
TOTAL	129	41	354	20	222	93	1	860
Row %	15.0	4.8	41.2	2.3	25.8	10.8	0.1	

[1] Non-lithic materials deleted

Table B-20. Object edge angle by kind of wear, 45-DO-285.

Edge angle (degrees)	Abrasion/ grinding	Smoothing	Crushing/ pecking	Feathered chipping	Feathered chipping/ smoothing	Hinged chipping	Hinged chipping/ smoothing	Hinged chipping/ crushing	Total[1]
1-5	-	-	-	1	-	-	-	-	1
Row %	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	
Col %	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.1
Total %	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	
6-10	-	-	-	37	-	2	-	-	39
Row %	0.0	0.0	0.0	94.9	0.0	5.1	0.0	0.0	
Col %	0.0	0.0	0.0	7.4	0.0	0.9	0.0	0.0	4.5
Total %	0.0	0.0	0.0	4.3	0.0	0.2	0.0	0.0	
11-15	-	1	-	57	2	5	-	-	65
Row %	0.0	1.5	0.0	87.7	3.1	7.7	0.0	0.0	
Col %	0.0	2.7	0.0	11.4	6.1	2.2	0.0	0.0	7.6
Total %	0.0	0.1	0.0	6.6	0.2	0.6	0.0	0.0	
16-20	-	2	-	88	2	18	1	-	111
Row %	0.0	1.8	0.0	79.3	1.8	16.2	0.9	0.0	
Col %	0.0	5.4	0.0	17.6	6.1	7.9	4.0	0.0	12.9
Total %	0.0	0.2	0.0	10.2	0.2	2.1	0.1	0.0	
21-25	-	1	-	49	-	13	2	-	65
Row %	0.0	1.5	0.0	75.4	0.0	20.0	3.1	0.0	
Col %	0.0	2.7	0.0	9.8	0.0	5.7	8.0	0.0	7.6
Total %	0.0	0.1	0.0	5.7	0.0	1.5	0.2	0.0	
26-30	-	1	-	55	4	13	1	-	74
Row %	0.0	1.4	0.0	74.3	5.4	17.6	1.4	0.0	
Col %	0.0	2.7	0.0	11.0	12.1	5.7	4.0	0.0	8.6
Total %	0.0	0.1	0.0	6.4	0.5	1.5	0.1	0.0	
31-35	-	5	-	26	2	13	-	-	46
Row %	0.0	10.9	0.0	56.5	4.3	28.3	0.0	0.0	
Col %	0.0	13.5	0.0	5.2	6.1	5.7	0.0	0.0	5.3
Total %	0.0	0.6	0.0	3.0	0.2	1.5	0.0	0.0	
36-40	-	5	-	40	2	18	6	-	71
Row %	0.0	7.0	0.0	56.3	2.8	25.4	8.5	0.0	
Col %	0.0	13.5	0.0	8.0	6.1	7.9	24.0	0.0	8.3
Total %	0.0	0.6	0.0	4.7	0.2	2.1	0.7	0.0	
41-45	-	2	-	36	7	20	-	-	65
Row %	0.0	3.1	0.0	55.4	10.8	30.8	0.0	0.0	
Col %	0.0	5.4	0.0	7.2	21.2	8.8	0.0	0.0	7.6
Total %	0.0	0.2	0.0	4.2	0.8	2.3	0.0	0.0	

Table B-20. Cont'd.

Edge angle (degrees)	Abrasion/ grinding	Smoothing	Crushing/ pecking	Feathered chipping	Feathered chipping/ smoothing	Hinged chipping	Hinged chipping/ smoothing	Hinged chipping/ crushing	Total[1]
46-50	-	5	-	37	6	30	4	0	82
Row %	0.0	6.1	0.0	45.1	7.3	36.6	4.9	0.0	
Col %	0.0	13.5	0.0	7.4	18.2	13.2	16.0	0.0	9.5
Total %	0.0	0.6	0.0	4.3	0.7	3.5	0.5	0.0	
51-55	2	4	-	27	2	23	1	-	59
Row %	3.4	6.8	0.0	45.8	3.4	39.0	1.7	0.0	
Col %	100.0	10.8	0.0	5.4	6.1	10.1	4.0	0.0	6.9
Total %	0.2	0.5	0.0	3.1	0.2	2.7	0.1	0.0	
56-60	-	2	-	19	2	24	3	-	50
Row %	0.0	4.0	0.0	38.0	4.0	48.0	6.0	0.0	
Col %	0.0	5.4	0.0	3.8	6.1	10.6	12.0	0.0	5.8
Total %	0.0	0.2	0.0	2.2	0.2	2.8	0.3	0.0	
61-65	-	5	-	20	2	19	3	1	50
Row %	0.0	10.0	0.0	40.0	4.0	38.0	6.6	2.0	
Col %	0.0	13.5	0.0	4.0	6.1	8.4	12.0	100.0	5.8
Total %	0.0	0.6	0.0	2.3	0.2	2.2	0.3	0.1	
66-70	-	2	1	1	-	5	1	-	10
Row %	0.0	20.0	10.0	10.0	0.0	50.0	10.0	0.0	
Col %	0.0	5.4	2.9	0.2	0.0	2.2	4.0	0.0	1.2
Total %	0.0	0.2	0.1	0.1	0.0	0.6	0.1	0.0	
71-75	-	1	-	3	-	12	1	-	17
Row %	0.0	5.9	0.0	17.6	0.0	70.6	5.9	0.0	
Col %	0.0	2.7	0.0	0.6	0.0	5.3	4.0	0.0	2.0
Total %	0.0	0.1	0.0	0.3	0.0	1.4	0.1	0.0	
76-80	-	-	-	3	1	3	1	-	8
Row %	0.0	0.0	0.0	37.5	12.5	37.5	12.5	0.0	
Col %	0.0	0.0	0.0	0.6	3.0	1.3	4.0	0.0	0.9
Total %	0.0	0.0	0.0	0.3	0.1	0.3	0.1	0.0	
81-85	-	1	1	-	-	6	1	-	9
Row %	0.0	11.1	11.1	0.0	0.0	66.7	11.1	0.0	
Col %	0.0	2.7	2.9	0.0	0.0	2.6	4.0	0.0	1.0
Total %	0.0	0.1	0.1	0.0	0.0	0.7	0.1	0.0	

Table B-20. Cont'd.

Edge angle (degrees)	Abrasion/ grinding	Smoothing	Crushing/ pecking	Feathered chipping	Feathered chipping/ smoothing	Hinged chipping	Hinged chipping/ smoothing	Hinged chipping/ crushing	Total[1]
86-90	-	-	-	-	-	3	-	-	3
Row %	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	
Col %	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0	0.3
Total %	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	
>95	-	-	1	-	-	-	-	-	1
Row %	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	
Col %	0.0	0.0	2.9	0.0	0.0	0.0	0.0	0.0	0.1
Total %	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	
Surface	-	-	31	-	-	-	-	-	31
Row %	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	
Col %	0.0	0.0	91.2	0.0	0.0	0.0	0.0	0.0	3.6
Total %	0.0	0.0	3.6	0.0	0.0	0.0	0.0	0.0	
Miscellaneous	-	-	-	2	1	-	-	-	3
Row %	0.0	0.0	0.0	66.7	33.3	0.0	0.0	0.0	
Col %	0.0	0.0	0.0	0.4	3.0	0.0	0.0	0.0	0.3
Total %	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	
TOTAL	2	37	34	501	33	227	25	1	860
Row %	0.2	4.3	4.0	58.3	3.8	26.4	2.9	0.1	

[1] Non-lithic materials deleted

Table B-21. Orientation of wear by zone, 45-DO-285.

Orientation of wear	Zone				Total[1]
	1	2	3	4	
Oblique	4	2	2	3	11
Col %	1.3	2.2	0.9	1.3	1.3
Perpendicular	278	90	217	220	805
Col %	92.7	96.8	92.3	94.8	93.6
Diffuse	3	0	4	3	10
Col %	1.0	0.0	1.7	1.3	1.2
Indeterminate	15	1	12	6	34
Col %	5.0	1.1	5.1	2.6	4.0
TOTAL	300	93	235	232	860

[1] Non-lithic materials deleted

Table B-23. Kind of wear by utilization/ manufacture on lithic tools, 45-DO-285.

Kind of wear	Zone			
	1	2	3	4
Smoothing				
Wear only	7	-	9	5
Wear and manufacture	22	8	22	24
Total	29	8	31	29
Crushing/pecking				
Wear only	18	-	10	2
Wear and manufacture	3	-	2	-
Total	21	-	12	2
Feathered chipping				
Wear only	146	45	115	106
Wear and manufac	29	10	22	28
Total	175	55	137	134
Hinged chipping				
Wear only	43	18	19	26
Wear and manufacture	32	12	36	41
Total	75	30	55	67

Table B-22. Edge angle by utilization-modification, 45-DO-285.

Edge angle (degrees)	Wear only	Wear and manufacture	Total
1-5	1	-	1
Row %	100.0	0.0	
Col %	0.2	0.0	0.1
Total %	0.1	0.0	
6-10	38	1	39
Row %	97.4	2.6	
Col %	6.7	0.3	4.5
Total %	4.4	0.1	
11-15	61	4	65
Row %	93.8	6.2	
Col %	10.7	1.4	7.6
Total %	7.1	0.5	
16-20	95	16	111
Row %	85.6	14.4	
Col %	16.7	5.5	12.9
Total %	11.0	1.9	
21-25	54	11	65
Row %	83.1	16.9	
Col %	9.5	3.8	7.6
Total %	6.3	1.3	
26-30	58	16	74
Row %	78.4	21.6	
Col %	10.2	5.5	8.6
Total %	6.7	1.9	
31-35	31	15	46
Row %	67.4	32.6	
Col %	5.4	5.2	5.3
Total %	3.6	1.7	
36-40	41	30	71
Row %	57.7	42.3	
Col %	7.2	10.3	8.3
Total %	4.8	3.5	
41-45	39	26	65
Row %	60.0	40.0	
Col %	6.9	8.9	7.6
Total %	4.5	3.0	
46-50	43	39	82
Row %	52.4	47.6	
Col %	7.6	13.4	9.5
Total %	5.0	4.5	
51-55	25	34	59
Row %	42.4	57.6	
Col %	4.4	11.7	6.9
Total %	2.9	4.0	
56-60	21	29	50
Row %	42.0	58.0	
Col %	3.7	10.0	5.8
Total %	2.4	3.4	
61-65	15	35	50
Row %	30.0	70.0	
Col %	2.6	12.0	5.8
Total %	1.7	4.1	
66-70	1	9	10
Row %	10.0	90.0	
Col %	0.2	3.1	1.2
Total %	0.1	1.0	
71-75	7	10	17
Row %	41.2	58.8	
Col %	1.2	3.4	2.0
Total %	0.8	1.2	
76-80	3	5	8
Row %	37.5	62.5	
Col %	0.5	1.7	0.9
Total %	0.3	0.6	
81-85	2	7	9
Row %	22.2	77.8	
Col %	0.4	2.4	1.0
Total %	0.2	0.8	
86-90	1	2	3
Row %	33.3	66.7	
Col %	0.2	0.7	0.3
Total %	0.1	0.2	
>95	-	1	1
Row %	0.0	100.0	
Col %	0.0	0.3	0.1
Total %	0.0	0.1	
Surface	30	1	31
Row %	96.8	3.2	
Col %	5.3	0.3	3.6
Total %	3.5	0.1	
Miscellaneous	3	-	3
Row %	100.0	0.0	
Col %	0.5	0.0	0.3
Total %	0.3	0.0	
TOTAL	569	291	860
Row %	66.2	33.8	

[1] Non-lithic materials deleted

Table B-24. Dimensions of morphological projectile point classification.

DIMENSION I: BLADE-STEM JUNCTURE	**DIMENSION VII: CROSS SECTION**
N. Not separate	N. Not applicable
1. Side-notched	1. Planoconvex
2. Shouldered	2. Biconvex
3. Squared	3. Diamond
4. Barbed	4. Trapezoidal
9. Indeterminate	9. Indeterminate
DIMENSION II: OUTLINE	**DIMENSION VIII: SERRATION**
N. Not applicable	N. Not applicable
1. Triangular	1. Not serrated
2. Lanceolate	2. Serrated
9. Indeterminate	9. Indeterminate
DIMENSION III: STEM EDGE ORIENTATION	**DIMENSION IX: EDGE GRINDING**
N. Not applicable	N. Not applicable
1. Straight	1. Not ground
2. Contracting	2. Blade edge
3. Expanding	3. Stem edge
9. Indeterminate	9. Indeterminate
DIMENSION IV: SIZE	**DIMENSION X: BASAL EDGE THINNING**
N. Not applicable	N. Not applicable
1. Large	1. Not thinned
2. Small	2. Short flake scars
	3. Long flake scars
DIMENSION V: BASAL EDGE SHAPE	9. Indeterminate
N. Not applicable	**DIMENSION XI: FLAKE SCAR PATTERN**
1. Straight	
2. Convex	N. Not applicable
3. Concave	1. Variable
4. Point	2. Uniform
5. 1 or 2 and notched	3. Mixed
9. Indeterminate	4. Collateral
	5. Transverse
DIMENSION VI: BLADE EDGE SHAPE	6. Other
	9. Indeterminate
N. Not applicable	
1. Straight	
2. Excurvate	
3. Incurvate	
4. Reworked	
9. Indeterminate	

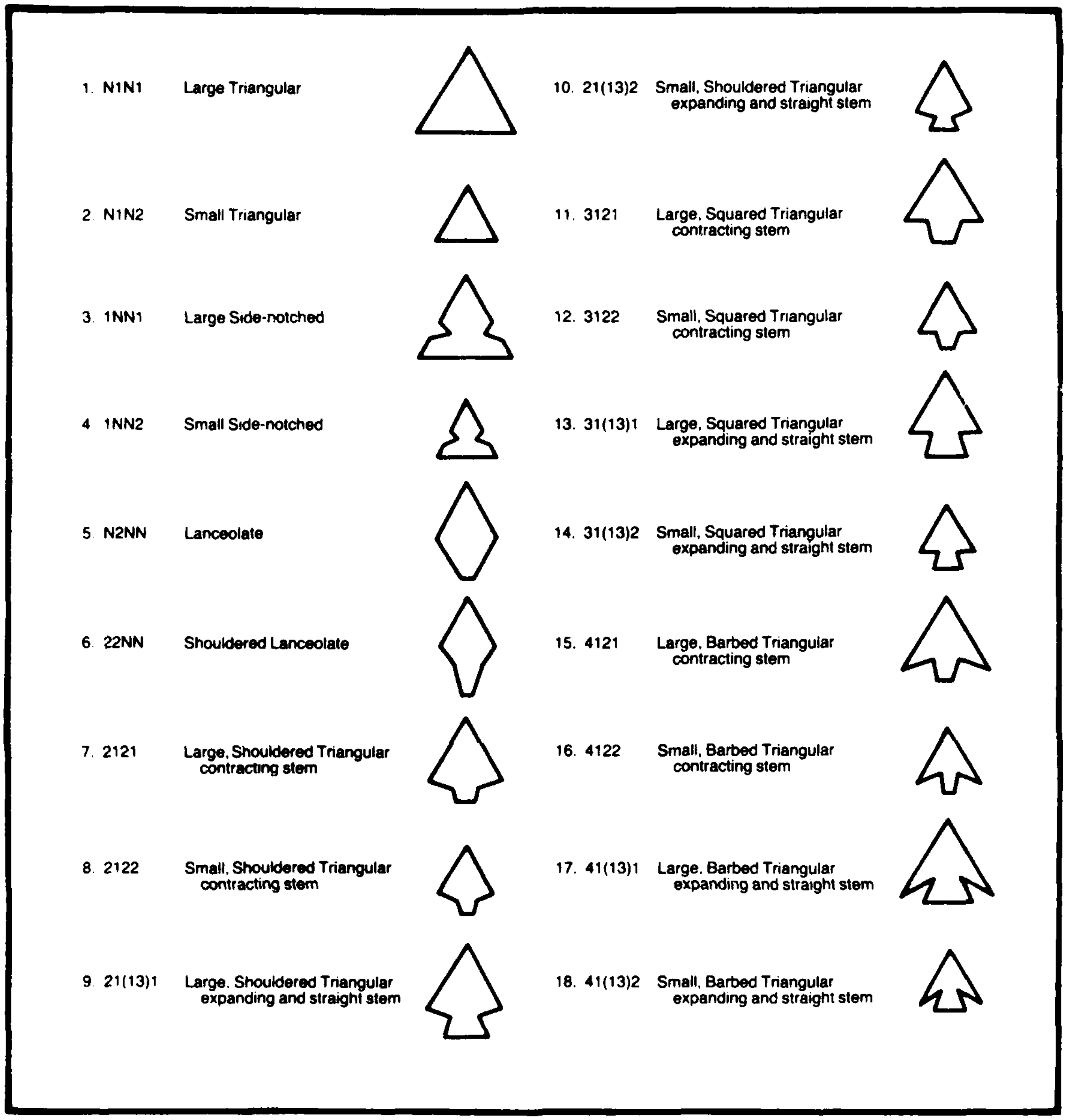


Figure B-1. Morphological projectile point type classification.

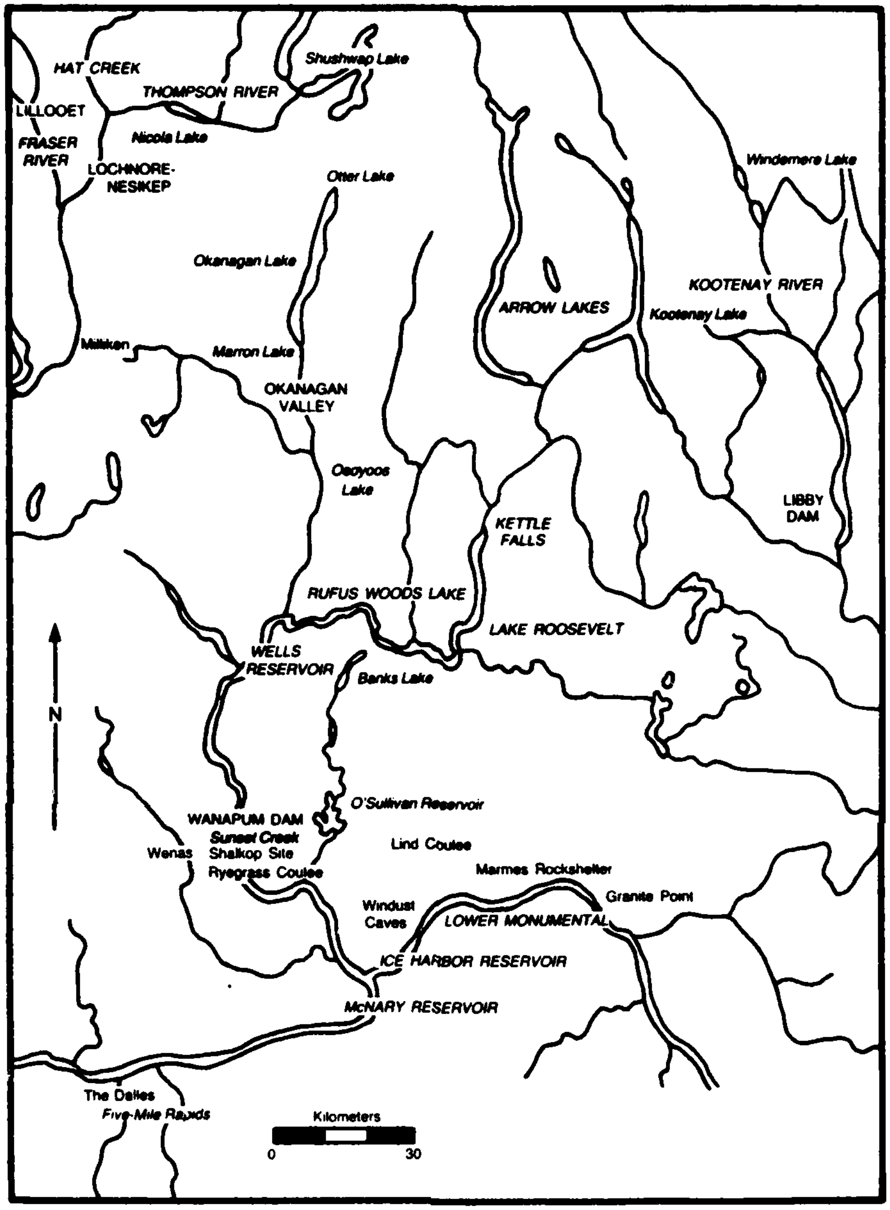


Figure B-2. Location of projectile point assemblages analyzed.

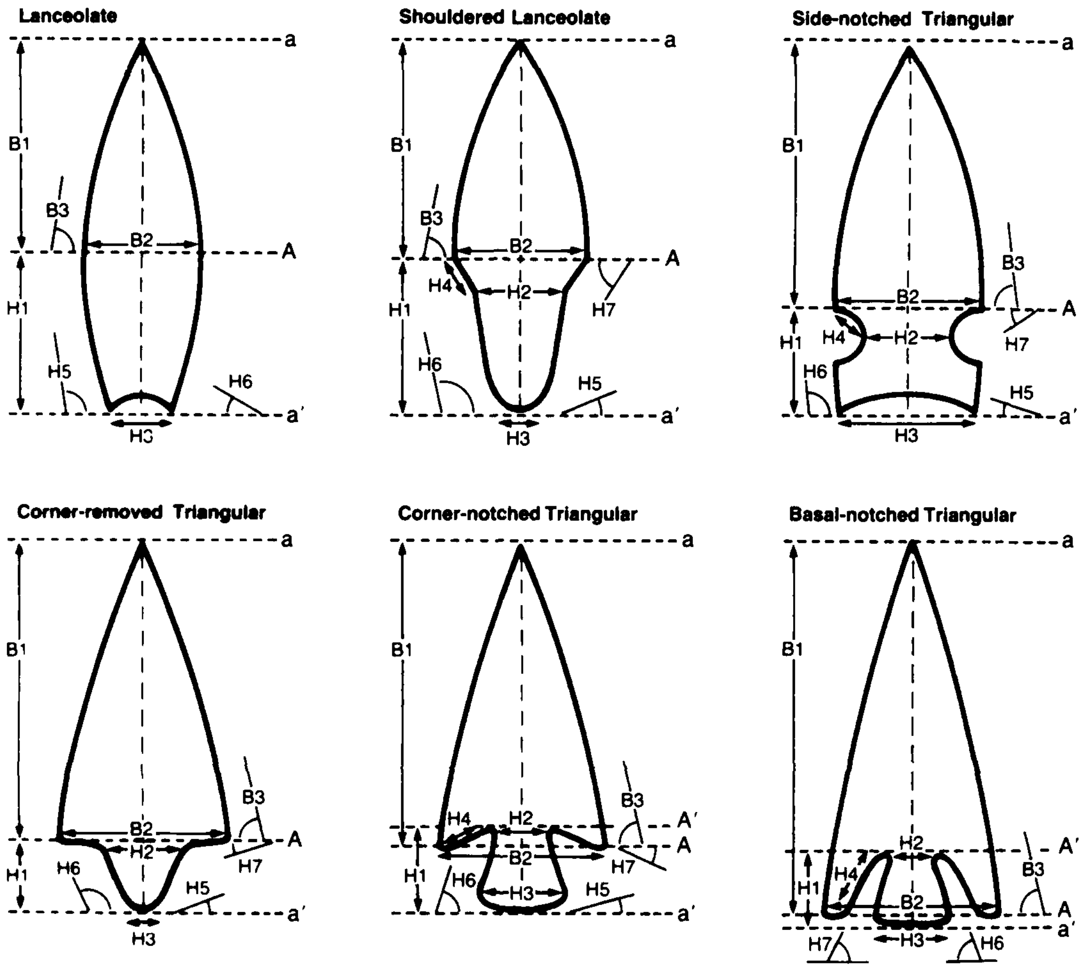
HISTORICAL TYPE CLASSIFICATION

DIVISION	LANCEOLATE		TRIANGULAR			
SERIES	SIMPLE	SHOULDERED	SIDE-NOTCHED	CORNER-REMOVED	CORNER-NOTCHED	BASAL-NOTCHED
TYPE	11 LARGE LANCEOLATE	12 LIND COULEE	41 COLD SPRINGS	51 NESPELEM BAR	61 COLUMBIA A Corner-notched	71 QUILOMENE A Basal-notched
	15 WINDUST C Contracting base	13 WINDUST A	42 PLATEAU Side-notched	52 RABBIT ISLAND A	62 QUILOMENE Corner-notched	72 QUILOMENE B Basal-notched
	21 CASCADE A	14 WINDUST B		53 RABBIT ISLAND B	63 COLUMBIA B Corner-notched	73 COLUMBIA STEM A
	22 CASCADE B	31 MAHKIN SHOULDERED			64 WALLULA Rectangular stemmed	74 COLUMBIA STEM B
	23 CASCADE C					75 COLUMBIA STEM C

Types are numbered consecutively within formal series a two-digit code indicates the approximate temporal sequence of defined series and types

Type names are those most commonly applied Mahkin Shouldered and Nespelem Bar are types defined for the Rufus Woods Lake project area

Figure B-3. Historical projectile point type classification.



B1. Blade Length
B2. Blade Width
B3. Blade Angle
H1. Haft Length
H2. Neck Width
H3. Basal Width
H4. Shoulder Length
H5 Basal Angle
H6. Basal Margin Angle
H7. Shoulder Angle
R1. Blade Length/Total Length
R2. Neck Width/Basal Width
R3. Basal Width/Blade Width
R4. Notch Width/Shoulder Length
R5. Notch Width/Basal Margin Length

Figure B-4. Location of digitized landmarks and measurement variables on projectile points.

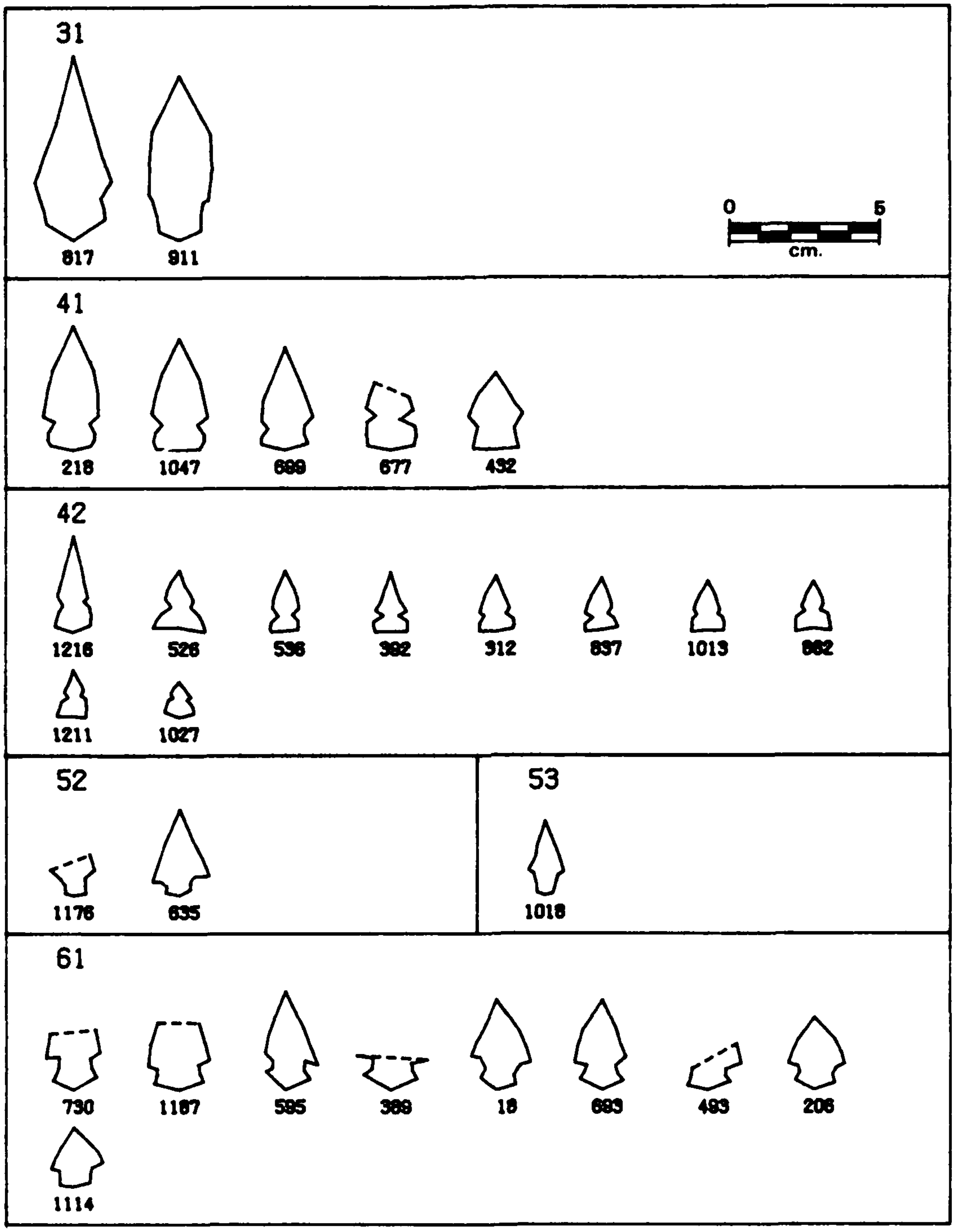


Figure B-5. Projectile point outlines from digitized measurements. Upper number is the historic type (see Figure B-3 for key). Lower number is the master number.

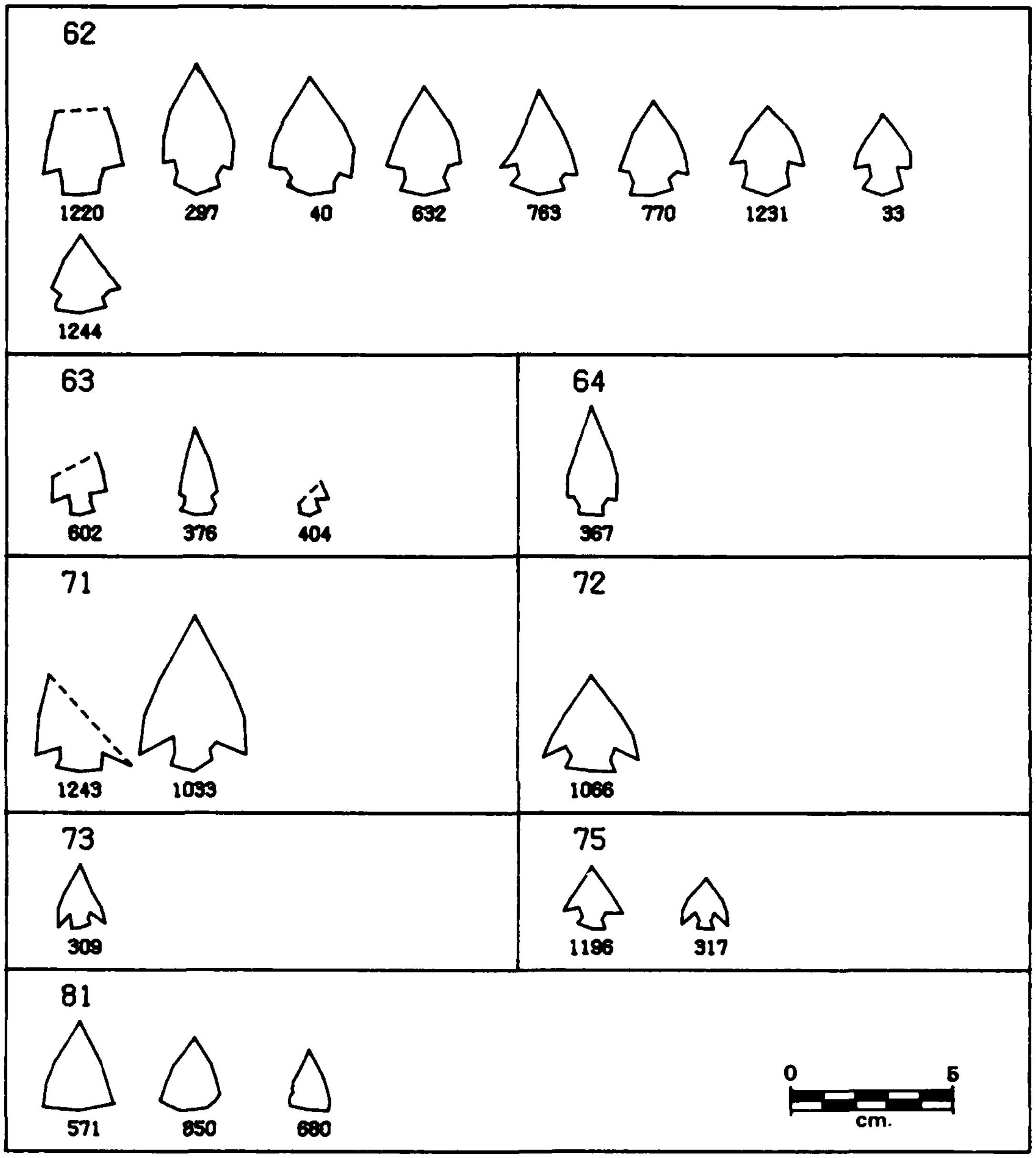


Figure B-5. Cont'd.

Table B-25. List of projectile points showing zone and types, 45-DO-285.

Master #	Zone	Morphological Type	Historical Type
297	1	41315929NN1	62 Quilomene Bar Corner-notched
309	1	41325122NN3	73 Columbia Stemmed A
312	1	1NN22121NN1	42 Plateau Side-notched
317	1	41329221NN3	75 Columbia Stemmed C
376	1	31322121NN3	63 Columbia Corner-notched B
389	1	31312929NN9	61 Columbia Corner-notched A
392	1	1NN21321NN1	42 Plateau Side-notched
404	1	41322929NN1	63 Columbia Corner-notched B
526	1	1NN23121NN1	42 Plateau Side-notched
536	1	1NN23921NN1	42 Plateau Side-notched
632	1	31312221NN3	62 Quilomene Bar Corner-notched
677	1	1NN21929NN1	41 Cold Spring Side-notched
680	1	N1N23221NN1	81 Not Assigned
763	1	41312341NN1	62 Quilomene Bar Corner-notched
837	1	1NN21122NN1	42 Plateau Side-notched
850	1	N1N22221NN1	81 Not Assigned
862	1	1NN23141NN1	42 Plateau Side-notched
911	1	22NN1211121	31 Shouldered Lanceolate
1013	1	1NN21121NN1	42 Plateau Side-notched
1018	1	31221311NN1	53 Rabbit Island B
1027	1	1NN22121NN1	42 Plateau Side-notched
1196	1	41323311NN1	75 Columbia Stemmed C
1211	1	1NN21122NN1	42 Plateau Side-notched
1216	1	1NN22321NN1	42 Plateau Side-notched
206	2	31312141NN1	61 Columbia Corner-notched A
367	2	31311141NN1	64 Wallula Rectangular-stemmed
571	2	N1N22121NN1	81 Not Assigned
602	2	41325929NN1	63 Columbia Corner-notched B
693	2	31312121NN1	61 Columbia Corner-notched A
218	3	1NN15121NN1	41 Cold Spring Side-notched
432	3	21313221NN1	41 Cold Spring Side-notched
493	3	41312929NN9	61 Columbia Corner-notched A
595	3	41312121NN1	61 Columbia Corner-notched A
635	3	31219321NN1	52 Rabbit Island A
699	3	21312141NN1	41 Cold Spring Side-notched
730	3	31312929NN1	61 Columbia Corner-notched A
770	3	31315221NN1	62 Quilomene Bar Corner-notched
1047	3	1NN15921NN1	41 Cold Spring Side-notched
1066	3	41313221NN1	72 Quilomene Bar Basal-notched B
1114	3	31322121NN3	61 Columbia Corner-notched A
1176	3	21122929NN9	52 Rabbit Island A
1187	3	31312121NN1	61 Columbia Corner-notched A
1220	3	31313329NN9	62 Quilomene Bar Corner-notched
817	4	22NN2321123	31 Shouldered Lanceolate
1033	4	41312121NN1	71 Quilomene Bar Basal-notched
1231	4	41312121NN1	62 Quilomene Bar Corner-notched
1243	4	41319929NN1	71 Quilomene Bar Basal-notched
1244	4	31312321NN1	62 Quilomene Bar Corner-notched

Table B-26. Descriptive statistics for projectile points, 45-DO-285.

Historical Type	Blade Length	Haft Length	Neck Width	Neck Width: Basal Width Ratio	Blade Length: Total Length Ratio
Shouldered Lanceolate					
$\bar{x}$	408.5	167.0	91.0	0.9	0.7
s.d.	9.9	37.5	11.3	0.1	–
N	2	2	2	2	2
Cold Springs Side notched					
$\bar{x}$	231.2	116.1	55.1	1.4	0.7
s.d.	67.7	11.9	8.5	0.3	0.1
N	4	5	5	5	4
Rabbit Island Stemmed A					
$\bar{x}$	229.5	70.5	47.5	0.8	0.8
s.d.	–	21.2	12.0	0.1	–
N	1	2	2	2	1
Rabbit Island Stemmed B					
$\bar{x}$	162.5	81.5	42.5	0.6	0.7
s.d.	–	–	–	–	–
N	1	1	1	1	1
Quilomene Bar Basal-notched					
$\bar{x}$	424.0	81.7	66.2	1.0	0.9
s.d.	–	23.7	1.8	0.1	–
N	1	2	2	2	1
Quilomene Bar Basal-notched B					
$\bar{x}$	253.5	75.0	73.5	1.0	0.9
s.d.	–	–	–	–	–
N	1	1	1	1	1
Quilomene Bar Corner-notched					
$\bar{x}$	224.7	85.7	70.7	1.0	0.7
s.d.	53.6	12.8	3.9	0.1	0.1
N	6	7	7	7	6
Columbia Corner-notched A					
$\bar{x}$	174.1	94.9	57.0	1.3	0.7
s.d.	43.9	14.3	7.3	0.2	–
N	4	8	8	8	4
Columbia Corner-notched B					
$\bar{x}$	197.0	60.7	33.3	1.2	0.7
s.d.	–	9.1	7.0	0.1	–
N	1	3	3	3	1
Columbia Stemmed A					
$\bar{x}$	187.0	47.5	30.0	1.0	1.0
s.d.	–	–	–	–	–
N	1	1	1	1	1
Columbia Stemmed C					
$\bar{x}$	140.7	54.0	34.0	1.0	0.8
s.d.	3.2	4.9	8.5	0.1	0.1
N	2	2	2	2	2
Wallula Rectangular Stemmed					
$\bar{x}$	281.5	54.0	51.5	0.7	0.8
s.d.	–	–	–	–	–
N	1	1	1	1	1
Plateau Side-notched					
$\bar{x}$	105.0	83.4	27.1	2.1	0.5
s.d.	41.7	16.6	5.8	0.4	0.1
N	10	10	10	10	10
Not Assigned					
$\bar{x}$	189.5	36.3	85.0	0.8	0.8
s.d.	61.8	18.4	27.5	0.4	0.1
N	3	3	3	3	3

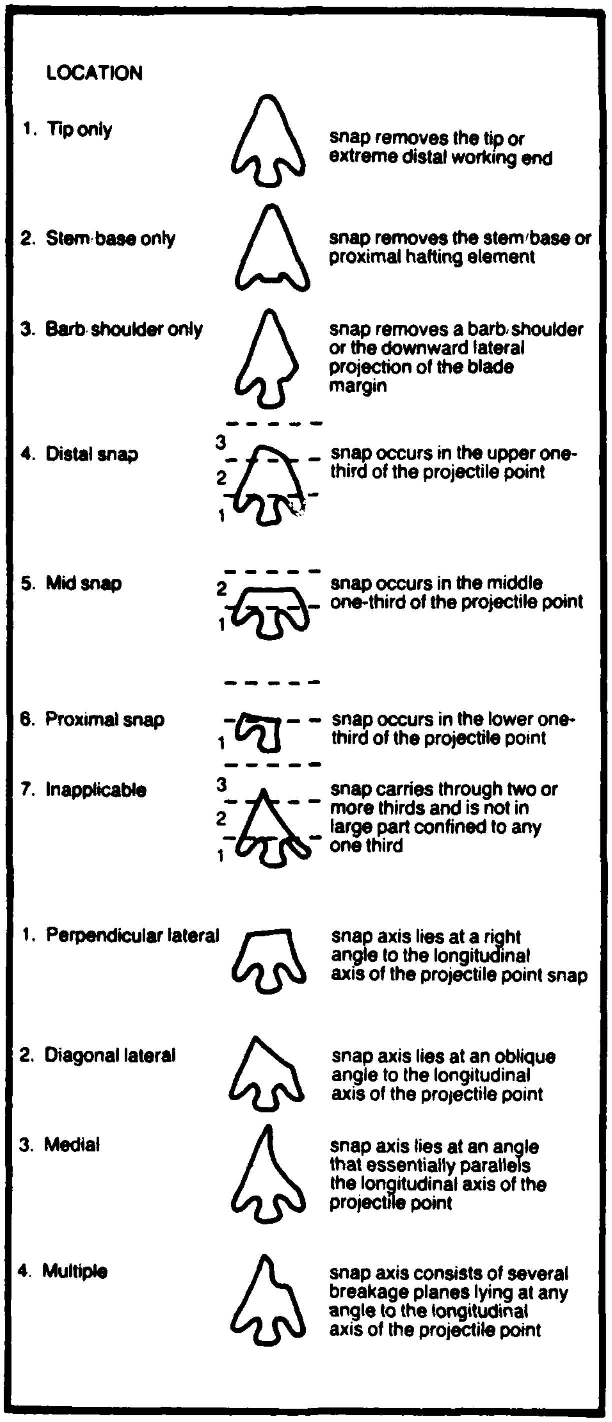


Figure B-6. Breakage terminology illustrated.
Not shown: Location (8)=reworked, Kind (5)= reworked.

Table B-27. Breakage by historic type, 45-DO-285.

Master #	Zone	Location	Kind	Historical Type
392	1	1	1	42 Plateau Side-notched
1013	1	1	1	42 Plateau Side-notched
1211	1	1	1	42 Plateau Side-notched
376	1	1	2	63 Columbia Corner-notched B
317	1	3	2	75 Columbia Stemmed C
763	1	4	2	62 Quilomene Bar Corner-notched
317	1	4	5	75 Columbia Stemmed C
677	1	5	4	41 Cold Spring Side-notched
389	1	5	4	61 Columbia Corner-notched A
297	1	5	4	62 Quilomene Bar Corner-notched
837	1	6	2	42 Plateau Side-notched
763	1	6	2	62 Quilomene Bar Corner-notched
526	1	6	3	42 Plateau Side-notched
536	1	7	2	42 Plateau Side-notched
404	1	7	2	63 Columbia Corner-notched B
1027	1	8	5	42 Plateau Side-notched
1211	1	8	5	42 Plateau Side-notched
389	1	8	5	61 Columbia Corner-notched A
404	1	8	5	63 Columbia Corner-notched B
1196	1	8	5	75 Columbia Stemmed C
602	2	5	2	63 Columbia Corner-notched B
367	2	8	5	64 Wallula Rectangular-Stemmed
1114	3	1	1	61 Columbia Corner-notched A
699	3	3	2	41 Cold Spring Side-notched
1066	3	3	2	72 Quilomene Bar Basal-notched B
730	3	3	3	61 Columbia Corner-notched A
218	3	4	1	41 Cold Spring Side-notched
635	3	4	2	52 Rabbit Island A
1187	3	4	2	61 Columbia Corner-notched A
1047	3	5	1	41 Cold Spring Side-notched
1220	3	5	2	62 Quilomene Bar Corner-notched
730	3	5	4	61 Columbia Corner-notched A
635	3	6	2	52 Rabbit Island A
218	3	6	3	41 Cold Spring Side-notched
1114	3	6	3	61 Columbia Corner-notched A
218	3	7	3	41 Cold Spring Side-notched
493	3	7	4	61 Columbia Corner-notched A
1176	3	8	1	52 Rabbit Island A
432	3	8	5	41 Cold Spring Side-notched
595	3	8	5	61 Columbia Corner-notched A
1114	3	8	5	61 Columbia Corner-notched A
1066	3	8	5	72 Quilomene Bar Basal-notched B
1231	4	3	3	62 Quilomene Bar Corner-notched
817	4	4	1	31 Shouldered Lanceolate
1243	4	7	2	71 Quilomene Bar Basal-notched
1033	4	7	2	71 Quilomene Bar Basal-notched

APPENDIX C:

FAUNAL ASSEMBLAGE, 45-DO-285

Family Soricidae

Sorex spp.

Zone 3: 2 skull fragments.

Family Leporidae

Lepus cf. *townsendii*

Zone 3: 1 tibia fragment.

Family Sciuridae

Spermophilus spp.

Zone 1: 1 femur fragment.
Zone 2: 1 mandible fragment.
Zone 3: 1 maxilla fragment.

Marmota flaviventris

Zone 1: 2 mandible fragments, 3 tooth fragments, 1 ulna fragment.
Zone 2: 1 cervical vetebra.
Zone 3: 4 skull fragments, 5 tooth fragments, 1 humerus fragment, 3 radius fragments, 1 femur fragment, 1 tibia fragment.
Zone 4: 4 skull fragments, 5 mandible fragments, 12 teeth, 3 tooth fragments, 1 humerus fragment, 1 radius fragment, 3 ulna fragments, 1 tibia fragment, 1 astragalus.

Family Geomyidae

Thomomys talpoides

Zone 1: 4 skull fragments, 3 mandibles, 17 mandibles fragments, 1 scapula, 2 humeri, 4 humerus fragments, 3 femora, 1 tibia.

Zone 2: 1 skull, 7 skull fragments, 5 mandibles, 9 mandible fragments, 2 humeri, 2 humerus fragments, 1 ulna, 4 innominates, 1 innominate fragment, 5 femora, 1 femur fragment, 1 tibia, 1 tibia fragment.
Zone 3: 2 skulls, 11 skull fragments, 5 mandibles, 18 mandible fragments, 3 scapulae, 6 humeri, 2 humerus fragments, 3 ulnae, 7 innominates, 1 innominate fragment, 3 femora, 2 femur fragments, 1 tibia.
Zone 4: 1 skull, 9 skull fragments, 1 mandible, 36 mandible fragments, 3 scapulae, 6 humeri, 4 humerus fragments, 1 radius, 1 ulna, 2 ulna fragments, 7 innominates, 1 innominate fragment, 6 femora, 3 femur fragments, 2 tibias, 1 tibia fragment.

Family Heteromyidae

Perognathus parvus

Zone 1: 14 skull fragments, 14 mandibles, 6 mandible fragments, 2 innominates, 3 innominate fragments, 1 femur, 1 femur fragment, 2 tibias.
Zone 2: 1 skull, 4 skull fragments, 4 mandibles, 5 mandible fragments, 1 humerus.
Zone 3: 6 skull fragments, 3 mandibles, 7 mandible fragments, 2 femur fragments.
Zone 4: 1 mandible, 1 mandible fragment.

Family Cricetidae

Zone 1: 3 skull fragments, 14 mandible fragments, 2 innominates, 1 femur.
Zone 2: 3 skull fragments, 7 mandible fragments, 1 molar, 1 humerus, 3 innominates.
Zone 3: 3 skull fragments, 6 mandible fragments, 1 innominate, 1 innominate fragment, 1 femur.
Zone 4: 2 skull fragments, 8 mandible fragments, 2 innominates, 2 innominate fragments, 1 femur.

Peromyscus maniculatus

Zone 1: 2 mandibles, 2 mandible fragments.
Zone 2: 1 mandible.
Zone 3: 1 mandible fragment.

Microtus spp.

Zone 1: 2 skull fragments, 1 mandible.
Zone 2: 2 mandibles.
Zone 3: 1 mandible fragment.
Zone 4: 2 mandible fragments.

Lagurus curtatus

Zone 1: 2 skull fragments, 2 mandibles, 8 mandible fragments.
Zone 2: 3 skulls, 1 skull fragment, 10 mandibles, 1 mandible fragment.
Zone 3: 1 mandible, 2 mandible fragments.
Zone 4: 2 skull fragments, 6 mandible fragments.

Family Canidae

Canis spp.

Zone 2: 1 tooth fragment.
Zone 3: 1 tooth.
Zone 4: 2 tooth fragments.

Family Mustelida

Taxidea taxus

Zone 3: 1 phalanx.

Family Cervidae

Zone 1: 4 antler fragments.
Zone 3: 1 antler fragment.
Zone 4: 1 antler fragment.

Cervus elaphus

Zone 1: 1 scapula fragment.
Zone 2: 1 tooth.
Zone 3: 2 teeth, 3 tooth fragments, 1 innominate fragment, 1 metapodial fragment, 2 phalanx fragments.
Zone 4: 1 mandible fragment, 1 tooth, 3 tooth fragments, 1 distal fibula.

Odocoileus spp.

Zone 1: 1 tooth fragment, 1 ulna fragment, 1 innominate fragment, 1 calcaneus, 3 phalanx fragments.
Zone 2: 2 tooth fragments, 1 astragalus.
Zone 3: 1 skull fragment, 3 teeth, 6 tooth fragments, 1 humerus fragment, 1 metatarsal fragment, 1 phalanx.
Zone 4: 1 tooth, 3 tooth fragments, 1 astragalus, 1 calcaneus, 1 antler fragment.

Family Bovidae

Bison sp.

Zone 3: 2 skull fragments, 1 femur fragment, 1 scaphoid, 1 naviculocuboid fragment, 1 astragalus, 1 phalanx.
Zone 4: 1 thoracic vertebra fragment, 1 tibia fragment, 1 metapodial fragment, 1 distal fibula, 1 phalanx fragment.

Ovis canadensis

Zone 1: 1 phalanx, 2 phalanx fragments.
Zone 2: 1 phalanx fragment.
Zone 3: 1 tooth fragment, 1 radius fragment, 2 metatarsal fragments, 1 astragalus, 1 phalanx, 2 phalanx fragments.
Zone 4: 1 tooth, 1 astragalus fragment, 1 phalanx fragment.

Deer-Sized

Zone 1: 1 thoracic vertebra fragment, 2 rib fragments, 1 humerus fragment, 2 tibia fragments, 1 naviculocuboid fragments.
Zone 2: 2 astragalus fragment.
Zone 3: 1 atlas vertebra fragment, 1 cervical vertebra fragment, 1 rib fragment, 1 scapula fragment, 1 humerus fragment, 1 radius fragment, 1 ulna fragment, 1 metacarpal fragment, 1 innominate fragment, 1 tibia fragment, 1 calcaneus fragment, 1 naviculocuboid fragment, 1 metatarsal fragment, 1 sesamoid.
Zone 4: 1 skull fragment, 4 lumbar vertebra fragments, 1 scapula fragment, 1 scaphoid, 1 trapezoid magnum, 1 cuneiform, 2 innominate fragments, 1 femur fragment, 1 tibia fragment, 1 phalanx fragment.

Elk-Sized

Zone 1: 1 scaphoid fragment.
Zone 3: 1 mandible fragment, 1 cervical vertebra fragment, 6 rib fragments, 1 humerus fragment.
Zone 4: 1 skull fragment, 1 thoracic vertebra, 1 vertebra centrum fragment, 1 sacrum fragment, 3 femur fragments, 2 tibia fragments.

Family Hominidae

Homo sapiens

Zone 1: 1 phalanx.
This human bone is an isolated find. No evidence of burial was noted in the field.

Family Chelydridae

Chrysemys picta

Zone 1: 10 shell fragments.
Zone 2: 4 shell fragments.
Zone 3: 6 shell fragments.
Zone 4: 3 shell fragments.

Family Ranidae/Bufonidae

Zone 1: 1 skull fragment, 2 innominate fragments, 1 femur fragment.
Zone 2: 1 radioulna, 1 tibiofibula
Zone 3: 29 humerus fragments, 18 radioulnae, 41 innominate fragments, 14 femora, 12 tibiofibulas.
Zone 4: 8 humeri, 7 radioulnas, 15 innominate fragments, 7 femora, 8 tibiofibulas, 2 skull fragments.

Family Salmonidae

Zone 1: 2 otoliths, 1 vertebra, 3 vertebra fragments.

Oncorhynchus tshawytscha (Chinook Salmon)

Zone 1: 31 otoliths, 30 otolith fragments.
Zone 2: 5 otoliths, 6 otolith fragments.
Zone 3: 3 otoliths, 6 otolith fragments.
Zone 4: 2 otoliths, 3 otolith fragments.

Family Cyprinidae

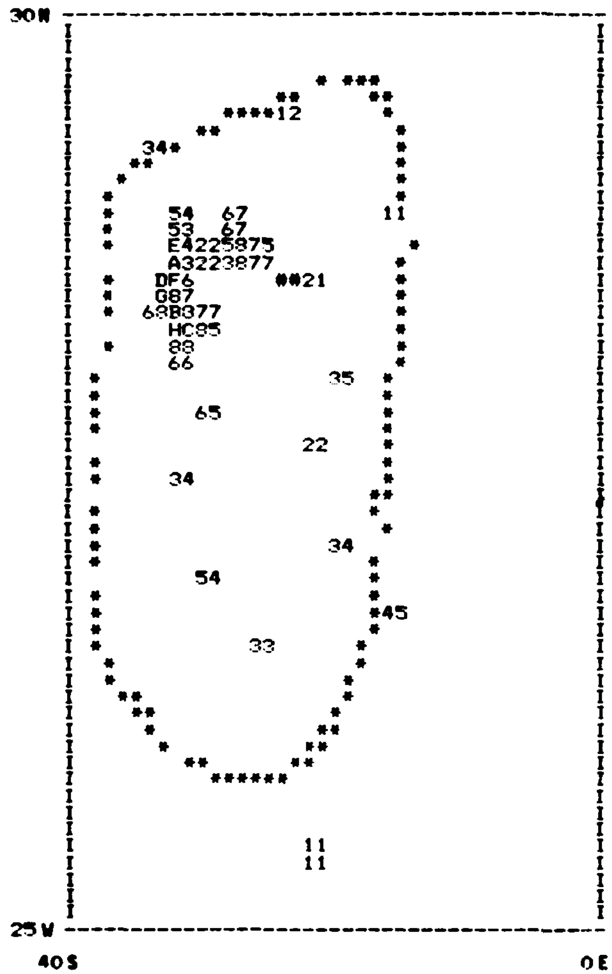
Zone 1: 2 vertebrae.

Family Catostomidae

Zone 1: 1 vertebra.

APPENDIX D:

ARTIFACT DISTRIBUTION, 45-DO-285



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	1	6
2	8	18
3	21	33
4	36	47
5	49	66
6	69	112
7	118	139
8	141	279
9	304	587
#	no data	

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	587	E	464
B	522	F	411
C	496	G	410
D	491	H	304

STATISTICS

Mean	117.4	Sum	8,454
s.d.	140.2	SS	2,407,608
Count	72	Var	19,652.3

Figure D-1. Distribution of lithics, Zone 4, 45-DO-285.

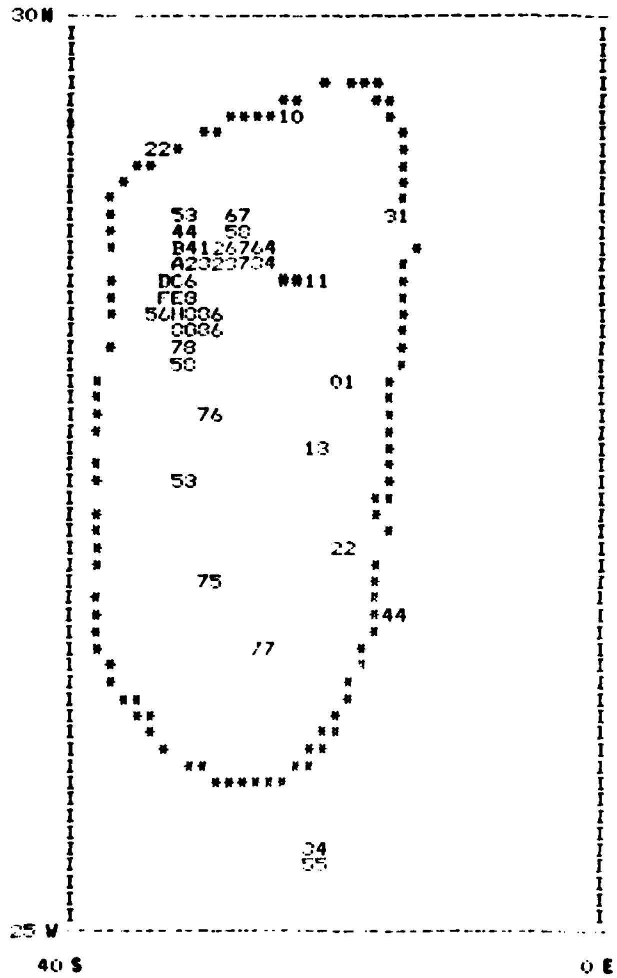


Figure D-2. Distribution of bone, Zone 4, 45-DO-285.

KEY

FREQUENCY INTERVALS

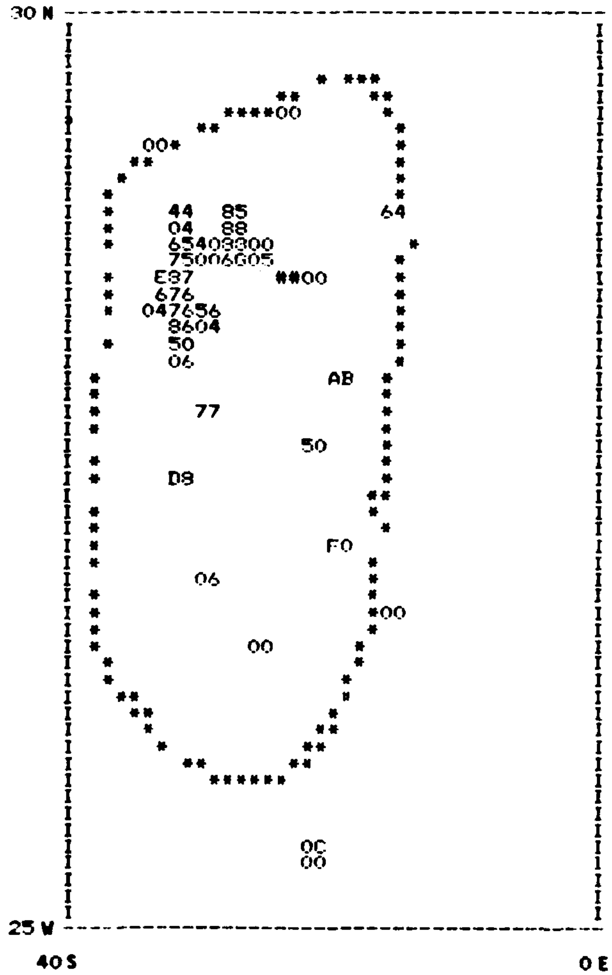
Interval	Minimum Value	Maximum Value
1	-	4
2	5	13
3	14	19
4	20	40
5	41	62
6	73	88
7	91	118
8	136	213
9	220	583
#	no data	

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	583	E	380
B	554	F	322
C	520	G	310
D	487	H	220

STATISTICS

Mean	97.9	Sum	7,050
s.d.	132.7	SS	1,957,476
Count	72	Var	17,589.5



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	–	–
2	-99	-99
3	-99	-99
4	1	1
5	2	3
6	5	6
7	7	9
8	11	20
9	23	96
#	no data	

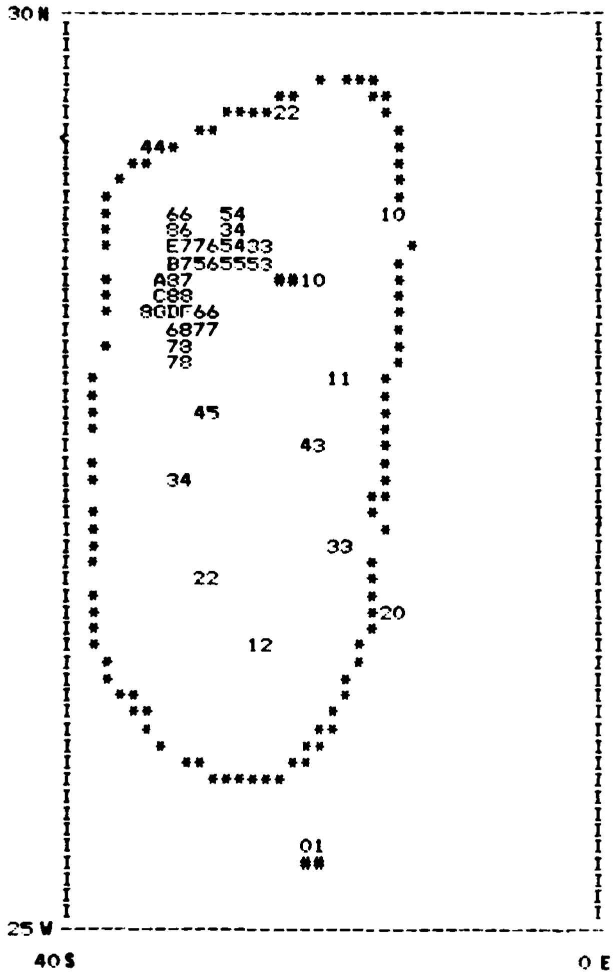
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	96	E	29
B	88	F	26
C	73	G	23
D	40		

STATISTICS

Mean	8.8	Sum	630
s.d.	18.0	SS	28,922
Count	72	Var	325.1

Figure D-3. Distribution of FMR, Zone 4, 45-DO-285.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	–	3
2	5	15
3	16	26
4	27	65
5	71	140
6	146	184
7	186	263
8	302	435
9	470	795
#	no data	

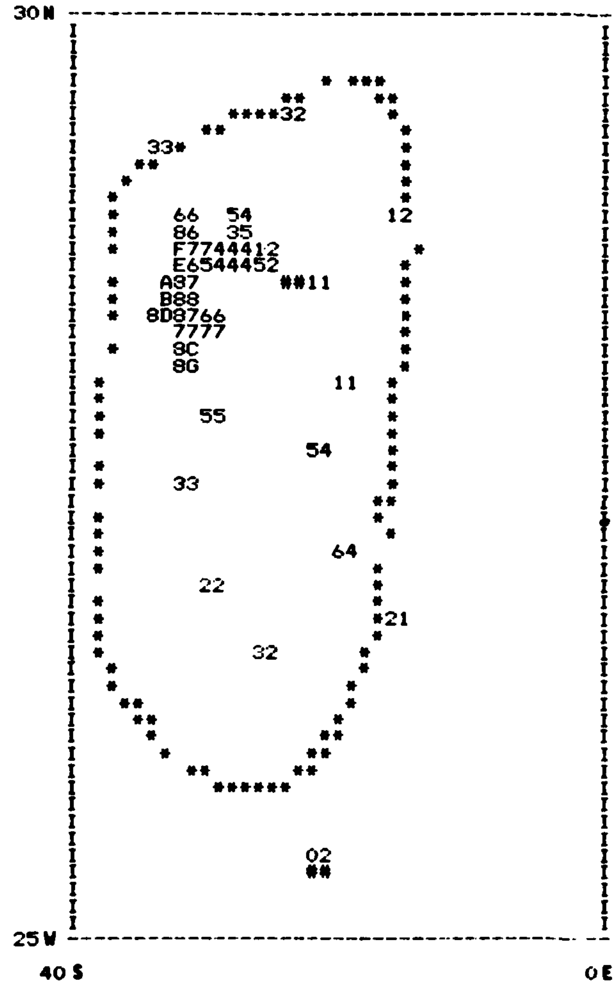
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	795	E	584
B	642	F	548
C	624	G	470
D	588		

STATISTICS

Mean	165.4	Sum	11,578
s.d.	189.0	SS	4,414,916
Count	70	Var	35,713.1

Figure D-4. Distribution of lithics, Zone 3, 45-DO-285.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	-	4
2	5	14
3	16	20
4	23	50
5	52	60
6	66	98
7	112	167
8	203	304
9	347	1,104
#	no data	

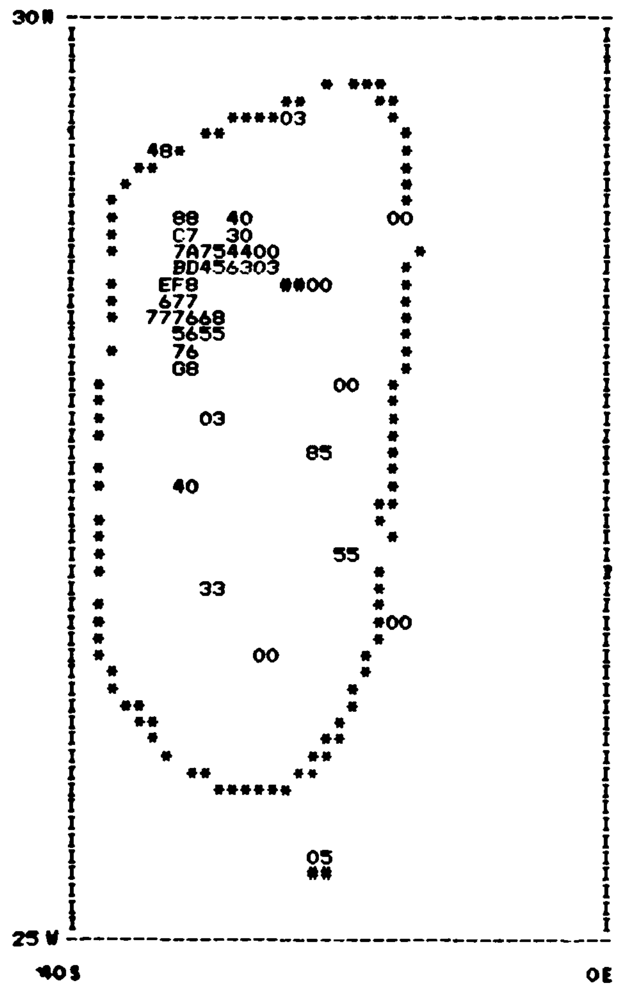
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	1,104	E	377
B	716	F	367
C	413	G	347
D	412		

STATISTICS

Mean	120.9	Sum	8,465
s.d.	178.5	SS	3,263,249
Count	70	Var	31,861.3

Figure D-5. Distribution of bone, Zone 3, 45-DO-285.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	-	-
2	-99	-99
3	1	1
4	2	3
5	5	9
6	10	13
7	14	17
8	18	24
9	27	52
#	no data	

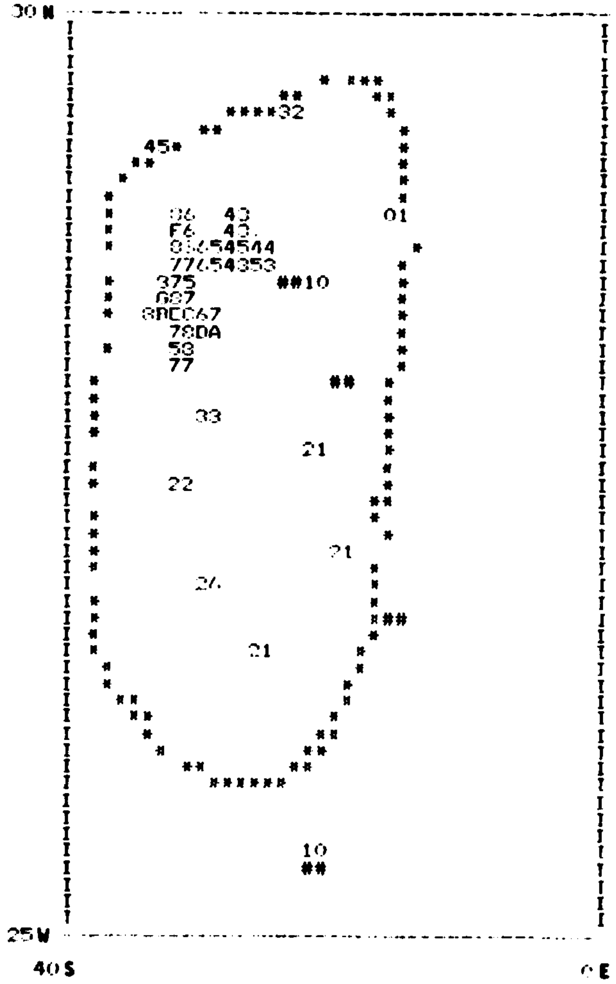
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	52	E	29
B	48	F	28
C	38	G	27
D	31		

STATISTICS

Mean	9.9	Sum	692
s.d.	11.5	SS	16,152
Count	70	Var	133.0

Figure D-6. Distribution of FMR, Zone 3, 45-DO-285.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	-	4
2	5	13
3	15	22
4	23	36
5	37	50
6	59	76
7	78	96
8	101	127
9	131	174
#	no data	

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	174	E	135
B	166	F	131
C	136	G	131
D	136		

STATISTICS

Mean	56.6	Sum	3,734
s.d.	47.3	SS	358,624
Count	66	Var	2,232.9

Figure D-7. Distribution of lithics, Zone 2, 45-DO-285.

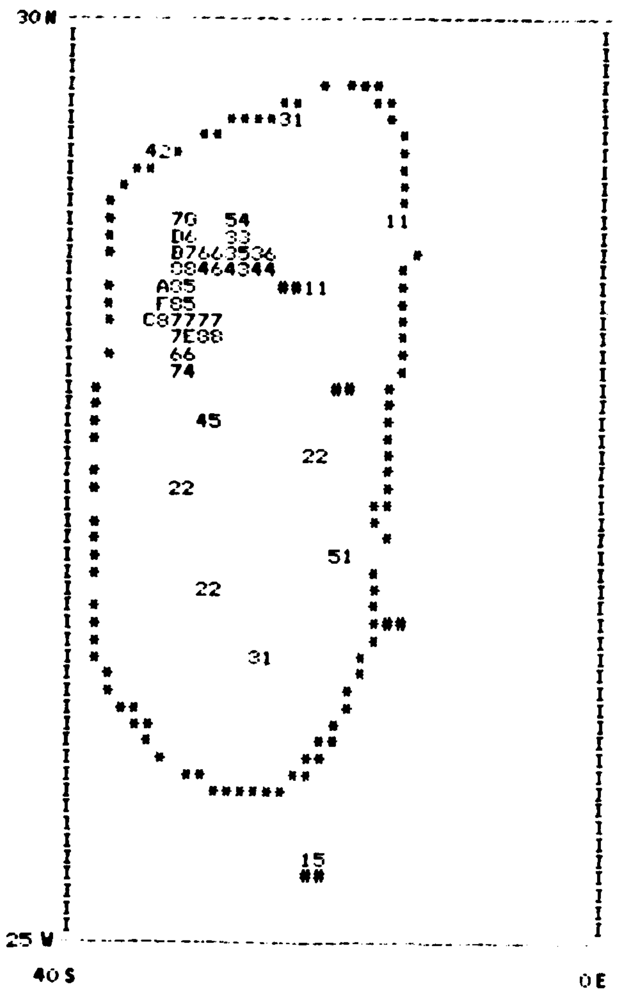


Figure D-8. Distribution of bone, Zone 2, 45-DO-285.

KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	1	5
2	6	10
3	11	13
4	14	21
5	22	28
6	29	40
7	41	55
8	56	72
9	73	107
#	no data	

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	107	E	77
B	98	F	75
C	90	G	73
D	83		

STATISTICS

Mean	32.4	Sum	2,138
s.d.	26.6	SS	116,151
Count	66	Var	709.5

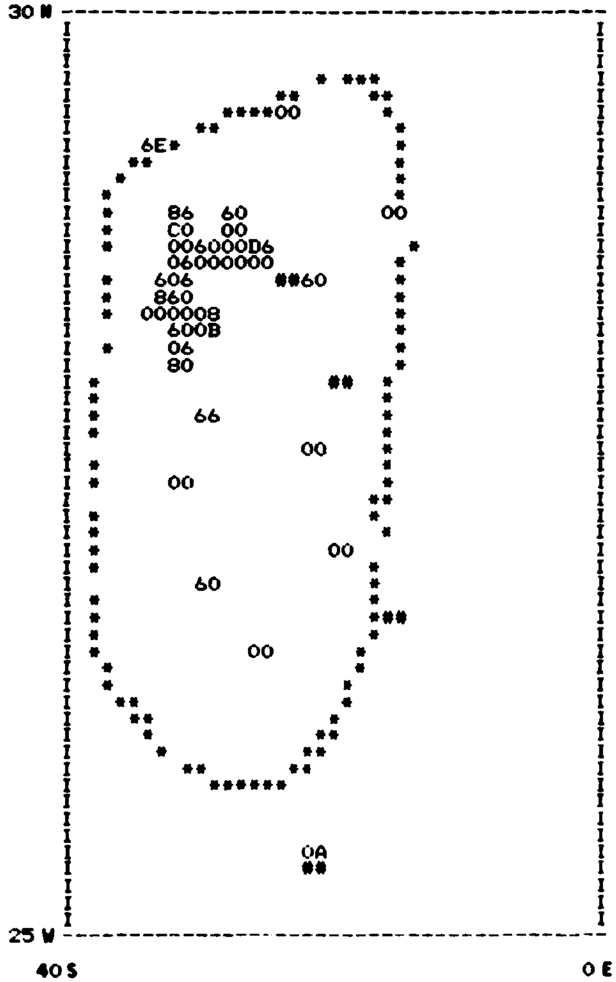


Figure D-9. Distribution of FMR, Zone 2, 45-DO-285.

KEY

FREQUENCY INTERVALS

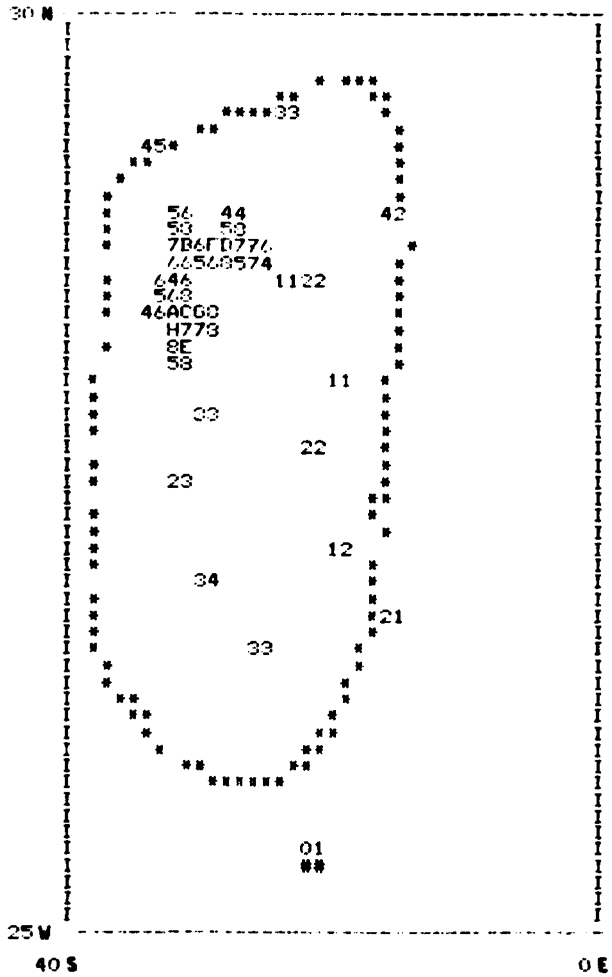
Interval	Minimum Value	Maximum Value
1	-	-
2	-99	-99
3	-99	-99
4	-99	-99
5	-99	-99
6	1	1
7	-99	-99
8	2	2
9	3	22
#	no data	

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	22	D	4
B	8	E	3
C	4		

STATISTICS

Mean	1.0	Sum	64
s.d.	2.9	SS	620
Count	66	Var	8.5



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	-	16
2	19	41
3	46	99
4	109	137
5	141	158
6	160	178
7	179	185
8	196	216
9	219	28
#	no data	

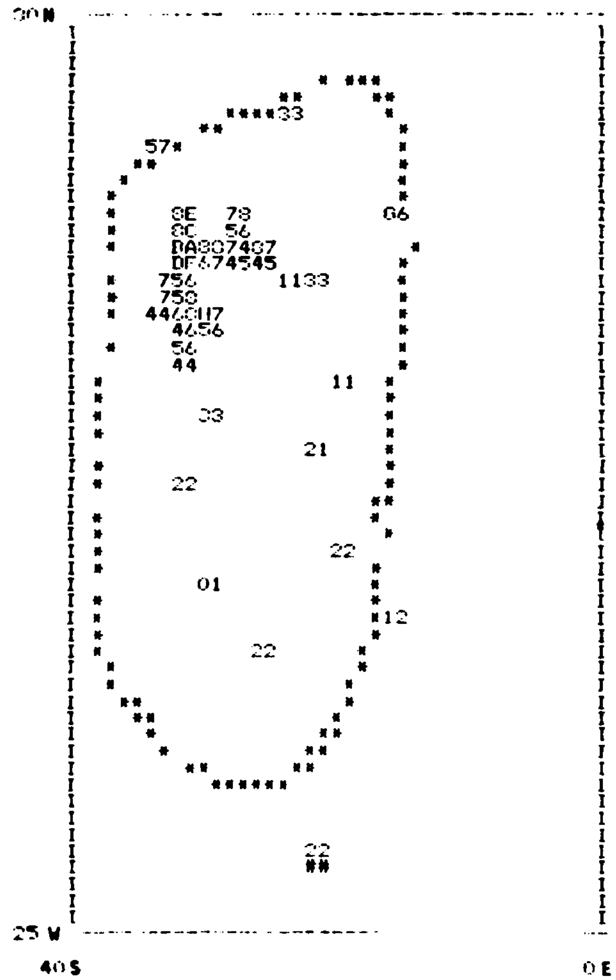
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	264	E	252
B	262	F	223
C	261	G	222
D	252	H	219

STATISTICS

Mean	132.1	Sum	9513
s.d.	79.0	SS	1,706,671
Count	72	Var	6,246.7

Figure D-10. Distribution of lithics, Zone 1, 45-DO-285.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	-	6
2	7	14
3	15	56
4	57	70
5	72	93
6	94	98
7	103	137
8	140	195
9	195	374
#	no data	

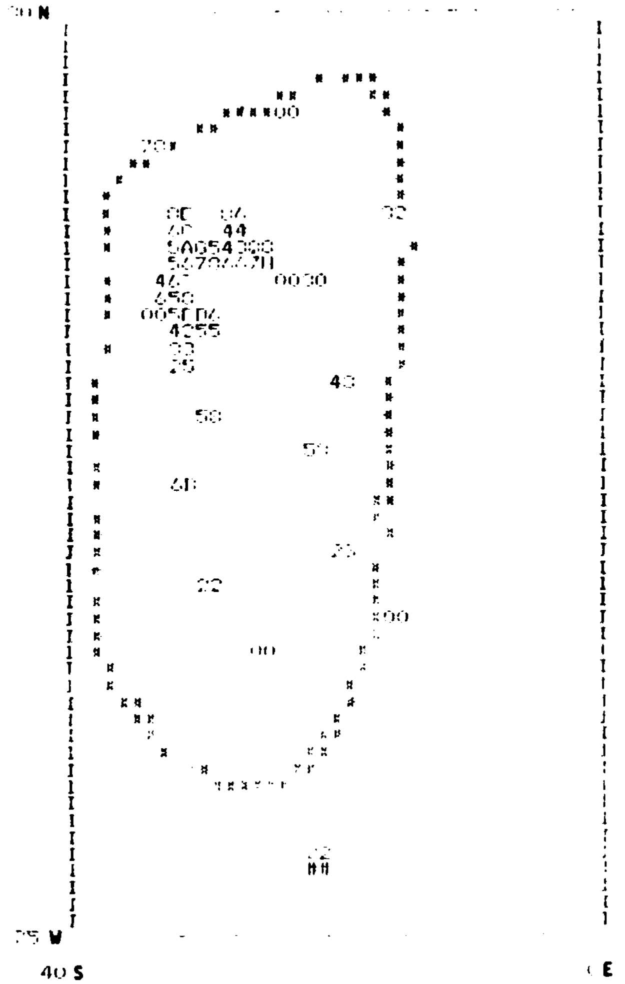
INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	374	E	214
B	310	F	207
C	286	G	198
D	267	H	195

STATISTICS

Mean	92.1	Sum	6634
s.d.	78.6	SS	1,058,508
Count	72	Var	6,184.1

Figure D-11. Distribution of bone, Zone 1, 45-DO-285.



KEY

FREQUENCY INTERVALS

Interval	Minimum Value	Maximum Value
1	-	-
2	1	2
3	3	4
4	6	7
5	8	10
6	11	14
7	15	18
8	20	27
9	29	57
#	no data	

INTERVAL 9 SUBDIVISIONS

Division	Value	Division	Value
A	57	E	39
B	54	F	34
C	47	G	30
D	45	H	29

STATISTICS

Mean	12.1	Sum	872
s.d.	13.0	SS	22,810
Count	72	Var	170.1

Figure D-12. Distribution of FMR, Zone 1, 45-DO-285.

APPENDIX E:

DESCRIPTION OF CONTENTS OF UNCIRCULATED APPENDICES

Detailed data from two different analyses are available in the form of hard copies of computer files with accompanying coding keys.

Functional analysis data include provenience (site, analytic zone, excavation unit and level, and feature number and level (if applicable); object master number; abbreviated functional object type; and coding that describes each tool on a given object. Data normally are displayed in alphanumeric order by site, analytic zone, functional object type, and master number. Different formats nay be available upon request depending upon research focus.

Faunal analysis data include provenience (site, analytic zone, excavation unit and level, feature number, and level (if applicable); taxonomy (family, genus, species); skeletal element; portion; side; sex; burning/butchering code; quantity; and age. Data normally are displayed in alphanumeric order by site, analytic zone, provenience, taxonomy, etc.

To obtain copies of the uncirculated appendices contact U.S. Army Corps of Engineers, Seattle District, Post Office Box C-3755, Seattle, Washington, 98124. Copies also are being sent to regional archives and libraries.

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